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Asbestos-Containing Materials in School Buildings: Bulk Sample Analysis Quality Assurance Program-Bulk Sample Rounds 9, 10, 11 and Blind Round 2

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Bulk Sample Analysis Quality Assurance Program—Bulk Sample Rounds 9, 10, 11 and Blind Round II

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D. A. Pasquini, M. L. Parris, L. T. Laird

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Laboratories received bulk samples of asbestos, asbestos substitutes or other bulk insulation materials. Three aspects of analytical results are considered: classification of a sample as either asbestos (positive) or nonasbestos (negative); identification of the specific type of asbestos present; and quantitation of the relative amount of major constituents present. A performance rating was made for each laboratory, based only on the ability to correctly classify samples. Reductions of all correct (4/4 or 3/3) scores were made only for the reporting of false positives and false negatives. Laboratories participating in rounds 9, 10, 11 and the second blind round correctly classified 92.1%, 97.2%, 94.9% and 97.9% of the samples, respectively, as an asbestos or nonasbestos containing material as described in the Federal Register, Vol. 47, No. 103, Thursday, May 27, 1982.

Continuation of the program is anticipated. Any commercial or noncommercial laboratories with capability in polarized light microscope analysis of bulk samples may participate. Results of commercial laboratories are published in the interim listing of "Commercial Laboratories with Polarized Light Microscope Capabilities for Bulk Asbestos Identification."

This report is submitted in fulfillment of contract number 68-02-3767 by Research Triangle Institute under the sponsorship of the U.S. Environmental Protection Agency. This report covers a period from January 1, 1984 to December 31, 1984 and work was completed as of June 30, 1985.

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ASBESTOS-CONTAINING MATERIALS IN SCHOOL BUILDINGS: BULK SAMPLE ANALYSIS QUALITY ASSURANCE PROGRAM

Bulk Sample Rounds 9, 10, 11 and Blind Round II

by

D. A. Pasquini, M. L. Parris, L. T. Laird
Research Triangle Institute
Research Triangle Park, North Carolina 27709

Contract No. 68-02-3767

Project Officer: Michael E. Beard

Quality Assurance Division
Environmental Monitoring System Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, N.C. 27711

Exposure Evaluation Division
Office of Toxic Substances
Office of Pesticides and Toxic Substances
U.S. Environmental Protection Agency
Washington, D.C. 20460

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ABSTRACT

This report presents the results of laboratories participating in the ninth, tenth, eleventh and second blind round(s) of the bulk sample analysis quality assurance program sponsored by the U.S. Environmental Protection Agency. Two hundred fifty-four, 320, 318 and 50 laboratories which analyze bulk samples for determination of asbestos content by polarized light microscopy participated in these rounds, respectively.

Laboratories received bulk samples of asbestos, asbestos substitutes or other bulk insulation materials. Three aspects of analytical results are considered: classification of a sample as either asbestos (positive) or nonasbestos (negative); identification of the specific type of asbestos present; and quantitation of the relative amount of major constituents present. A performance rating was made for each laboratory, based only on the ability to correctly classify samples. Reductions of all correct (4/4 or 3/3) scores were made only for the reporting of false positives and false negatives. Laboratories participating in rounds 9, 10, 11 and the second blind round correctly classified 92.1%, 97.2%, 94.9% and 97.9% of the samples, respectively, as an asbestos or nonasbestos containing material as described in the Federal Register, Vol. 47, No. 103, Thursday, May 27, 1982.

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SECTION 1

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Asbestos-in-Schools Program designated polarized light microscopy (PLM), supplemented when necessary by x-ray powder diffraction, as the recommended method for detecting asbestos in friable materials.[1,2] In January 1980, a quality assurance (QA) program was initiated for laboratories having capability in PLM analysis of bulk samples. The goals of the program were twofold: first, to assist laboratories in developing reliable PLM analytical capability by providing an independent check on data quality and by supplying characterized samples for use in internal quality control; and, second, to facilitate public access to competent analytical laboratories. Commercial or noncommercial laboratories with PLM analytical capabilities are eligible to participate in the EPA-QA program. Participation in this interlaboratory testing program does not lead to accreditation, certification, endorsement or other official approval for bulk asbestos sample analysis.

Participating commercial laboratories and their performance ratings are listed in a written report Commercial Laboratories with Polarized Light Microscope Capabilities for Bulk Asbestos Identification, Interim Listing Number XX, EPA Bulk Asbestos Round XX and made available after each QA round to EPA regional asbestos coordinators, state asbestos contacts, and the general public. Further information on the QA program, participating laboratories, and/or procedures for sampling and analysis of asbestos-containing bulk materials is available by contacting the Program Technical Information Service using the toll-free number 1-800-334-8571, extension 6741.

1 CFR, Title 40, Subpart F. Friable Asbestos-Containing Materials in schools. Section 763.109, Analyzing Friable Material.

2 Test Method - Interim Method for the Determination of Asbestos in Bulk Insulation Samples, U.S. Environmental Protection Agency, Publication Number EPA-600/M4-82-020, Environmental Monitoring Systems Laboratory, Research Triangle Park, North Carolina, December 1982.

Rounds 1 and 2 of the QA Program were conducted in 1980. Results were reported in two EPA reports: published in August 1980, EPA-560/13-80-23, EPA-560/5-81-001, and published in March 1981. Rounds 3 and 4 were conducted in June 1981 and January 1982, respectively, and results were reported in an RTI report (Contract Number 68-02-3431) in June 1982. The results of Rounds 5, 6, 7, 8, and Blind Round I were reported in an RTI report (Contract Number 68-02-3431) in February 1985. This report describes the results of Rounds 9, 10, 11, and Blind Round II.

SECTION 2

PROCEDURES AND METHODS

This section reviews the procedures and methods followed in conducting the QA bulk sample and blind rounds. Section 2.1 discusses the selection and distribution of the bulk samples, the reporting forms and laboratory instructions, the bulk sample reference reports, the laboratory reports, and the calculation of the laboratory's performance rating in Bulk Sample Rounds 9, 10, and 11. Section 2.2 discusses the selection of laboratories and analysis of the laboratory results in Blind Round II.

2.1 BULK SAMPLE ROUNDS

2.1.1 Bulk Sample Repository

Bulk sample materials are stored in a repository located at Research Triangle Institute in Research Triangle Park, North Carolina. The repository contains laboratory formulated asbestos and nonasbestos materials, real-world materials supplied by asbestos removal contractors and manufacturers, and fibrous asbestos substitutes that are purchased or provided by manufacturers. Industrial samples are taken from the bulk materials in the repository and packaged in plastic bags or plastic vials.

2.1.2 Selection of the Bulk Material Samples

When a bulk material is selected for distribution in a QA round, it is analyzed in the RTI Optical Microscopy Laboratory for uniformity and asbestos content. The results of this analysis are compared with results of the screening analysis performed on the bulk material when it was first received at the RTI repository. If the two analyses agree in terms of asbestos content and consistency, a sample of the bulk material is sent to the reference laboratory for characterization.

2.1.3 Reference Analysis of the Bulk Material Samples

Reference analysis of the bulk material samples are performed by the Bureau of Mines, U.S. Department of the Interior, Avondale, Maryland. The bulk sample is analyzed for asbestos content using PLM and, if the analyst deems it necessary, x-ray powder diffraction.

The bulk sample is first examined with a low power (approximately 10-45X) stereo binocular microscope for gross characterization. From two to eight slides are then prepared for PLM examination using material taken from different positions of each sample or each layer within a sample. Examination is done at magnification ranging from approximately 40X to 400X with most characterization being done at low power.

The number of slides prepared and examined are determined by the analyst's experience and his judgement of the component complexity and homogeneity of each sample or layer. The area percent of asbestos is visually estimated with the aid of modal percentage charts and this is converted to an estimated weight percent based on the analyst's experience with similar materials. Other fibrous nonasbestos materials in the bulk sample are estimated by weight percent in the same manner and listed in the analysis report. When a bulk sample contains two or more layers, each layer is weighted according to its thickness to calculate the total estimated weight percentage of the components for the entire bulk sample.

If the results of the reference analysis agree with the RTI analysis for a given bulk material sample, it is then confirmed for distribution in the QA round. Characteristics on which agreement between the reference analysis and the RTI analysis must be reached include: classification of the bulk sample as an asbestos containing or nonasbestos containing material, agreement on the type of asbestos if asbestos is present and general agreement on the composition of the major components of the sample.

2.1.4 Distribution of the Bulk Material Samples to the Participating Laboratories

Usually a set of four different bulk materials is sent to the participating laboratories in a given bulk material round. Each bulk sample is individually packaged in a sample vial or plastic bag, placed in another plastic bag, and then inserted into a padded envelope along with reporting and coding forms, and analysis instructions. Laboratories are given 20 working days following sample receipt to analyze the set of bulk material samples and to return their analytical results to RTI.

The reporting form, coding form, and instructions that are used by the participating laboratory to process and record their analytical results are included in Appendix A. The reporting form includes a data entry space for the identification of asbestos fibers and nonasbestos materials, analytical method(s) used, quantitative procedures used, and quality control measures employed. The coding form summarizes the information on the reporting form and is used by RTI to record a laboratory's analytical results.

2.1.5 Laboratory Performance Reports

Laboratory performance is based on the ability of a laboratory to determine if a bulk material sample does or does not contain greater than 1 percent asbestos. A performance rating is calculated based on the number of classification errors made by the laboratory. A classification error can either be a false positive (nonasbestos) or false negative (no asbestos reported in a sample containing greater than 1 percent asbestos).

A written report is sent to each participating laboratory at the completion of each round (see Appendix B). This report lists the qualitative results of the Bureau of Mine's reference analysis for each bulk sample, the participating laboratory's performance rating, the number of false negatives and/or positives reported by the participating laboratory, and a cumulative distribution for the percentage of asbestos reported in each bulk sample by the participating laboratories. Identification errors, resulting from the incorrect identification of a mineral species is also indicated on the report to laboratories. Identification errors do not result in a reduction of a laboratory's performance rating.

2.2 BLIND ROUND

2.2.1 Introduction

Great time and effort is assumed to be taken by the commercial laboratories in their analyses of bulk material QA samples. The purpose of the blind round is to determine to what extent the same results can be expected in terms of analytical accuracy and precision in their analyses of non-EPA bulk samples.

The EPA instructed RTI to prepare a separate set of bulk materials for analysis by a group of randomly selected commercial laboratories.

2.2.2 Procedures and Methods

The laboratories participating in the second blind round were randomly selected from those listed in the RTI publication Commercial Laboratories with Polarized Light Microscopy Capabilities for Bulk Asbestos Identification, Interim Listing Number 15, EPA Bulk Analysis Round 8.

Altogether 50 commercial laboratories participated in the second blind round. Table 1 lists these 50 laboratories and their geographical location.

TABLE 1. LISTING OF THE COMMERCIAL LABORATORIES PARTICIPATING IN BLIND ROUND II

Region	Laboratory name	Laboratory location
I	Aetna Insurance Company	Hartford, CT
	State of Connecticut	Hartford, CT
	ESA	Bedford, MA
	LBH Associates	Newton, MA
	Hartford Fire Insurance	Hartford, CT
	Tibbetts Engineering Corporation	New Bedford, MA
II	Atlantic Environmental, Inc.	Montville, NJ
	Alternative Ways, Inc.	Willingboro, NJ
	Kaselaan & D'Angelo Associates, Inc.	Haddon Heights, NJ
	Princeton Testing Laboratory	Princeton, NJ
	Inter-City Testing Laboratory	Mineola, NY
	IHI-Div. Kemron	Huntington, NY
	Enviro-Probe, Inc.	Bronx, NY
III	Tracor-Jitco, Inc.	Rockville, MD
	Lancaster Laboratories, Inc.	Lancaster, PA
	Microbac, Inc.	Erie, PA
	Pittsburgh Testing Labs	Pittsburgh, PA
	Commonwealth Laboratory, Inc,	Richmond, VA
	Industrial Hygiene & Occup. Med. Lab	Fairfax, VA

TABLE 1. (continued)

Region	Laboratory name	Laboratory location
IV	Tuscaloosa Testing Laboratory, Inc.	Tuscaloosa, AL
	Applied Technology Consultants	Opelika, AL
	Southern Research Institute	Birmingham, AL
	Thompson Engineering Testing	Mobile, AL
	Geo-Enviromental Services, Inc.	Atlanta, GA
	Law Engineering Testing Co.	Atlanta, GA
	McCrone Environmental Services	Norcross, GA
	McCoy and McCoy, Inc.	Madisonville, KY
	Environmental Protection Systems, Inc.	Jackson, MS
	Micro-Methods	Pascagoula, MS
V	CENCON	Chicago, IL
	Gabriel Laboratories, Ltd.	Chicago, IL
	Randolph and Associates	Peoria, IL
	MJH Mineralogical Consulting, Inc.	Apple Valley, MN
	Analytical Consulting Testing	Cuyahoga Falls, OH
	Herron Testing Laboratories	Cleveland, OH
	Bowser-Morner Testing Laboratories, Inc.	Dayton, OH
	A & G Microscopy	Arlington, WI
VI	Intox Laboratories, Inc.	Redfield, AR
	Albuchemist, Inc.	Albuquerque, NM
	Southwestern Laboratories, Inc.	Dallas, TX
VII	Baird Scientific	Carthage, MO
	Larron Laboratory	Cape Giradeau, MO
VIII	Mountain Analysts Corp.	Denver, CO
IX	Contaminant Analysis Services, Inc.	Tucson, AZ
	Fireman's Fund Insurance Co.	Petaluma, CA
	Finkel Analytical Laboratory	Long Beach, CA
	Health Science Associates	Los Alamitos, CA
	C.E.D., Inc.	Pinole, CA
	Casalina Associates, Inc.	Kaneohe, HI
X	Microlab Northwest	Redman, WA

The laboratory selection process followed the steps outlined below:

1. All of the commercial laboratories participating in Round 8 of the U.S. EPA's Bulk Asbestos Sample Quality Assurance Program were grouped by EPA Region (1 through 10). Table 2 lists the number of commercial laboratories by EPA region.

2. Fifty laboratories or approximatley 30 percent of the 169 commercial laboratories listed in Interim Listing Number 15, EPA Bulk Analysis Round 8 were selected to participate in the second blind round. The number of laboratories selected per EPA region corresponds to the proportionate percentage of laboratories located in a given EPA region. For example, Region 1 contained 20 (or 11.8 percent) of the 169 commercial laboratories that participated in Round 8 of the Bulk Sample Asbestos Quality Assurance Program. Therefore, Region I was allocated 6 (or approximately 12.0 percent) of the 50 commercial laboratories stated for the second blind round. Based on this type of rationale, the laboratory allocations for each EPA region were determined, as given in Table 2.

3. Each commercial laboratory that participates in the Bulk Sample Asbestos Quality Assurance Program is assigned a four-digit identification number as explained below:

   - The first digit corresponds to the EPA region (1 through 9 for Regions 1 through 9, and 0 for Region 10)
   - The second digit corresponds to the State (number 1 through 9 depending on the number of States located in the Region) where the laboratory is located.
   - The last two digits are a computer-assigned random number. A laboratory was selected for the second blind round when its computer-assigned random number matched the two-digit random number manually extracted from a random number table.

4. A commercial laboratory selected for the second blind round was replaced with another commercial laboratory located in the same EPA region when the originally selected laboratory

   - Did not accept samples for asbestos analysis,
   - Accepted bulk samples for asbestos analysis only from commercial clients,
   - Did not respond to the surveyor's request for information,
   - Had ceased operations,
   - Requested an analysis fee greater than $150 for three bulk asbestos samples, and/or
   - Recommended or referred the caller to another commercial laboratory.

TABLE 2. COMMERCIAL LABORATORY LISTING BY EPA REGION, AS GIVEN IN INTERIM LISTING, NUMBER 15, COMMERCIAL LABORATORIES WITH POLARIZED LIGHT MICROSCOPE CAPABILITIES FOR BULK ASBESTOS IDENTIFICATION, MARCH 1984

EPA Region	States in EPA region	Number of commercial laboratories located in region	Percentage of commercial laboratories located per region	Number of commercial laboratories surveyed per region
I	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont	20	11.8	6
II	New Jersey New York	23	13.6	7
III	Delaware Maryland Pennsylvania Virginia West Virginia District of Columbia	21	12.4	6
IV	Alabama Florida Georgia Kentucky Mississippi North Carolina South Carolina Tennessee	33	19.5	10

TABLE 2. (continued)

EPA Region	States in EPA region	Number of commercial laboratories located in region	Percentage of commercial laboratories located per region	Number of commercial laboratories surveyed per region
V	Illinois Indiana Michigan Minnesota Ohio Wisconsin	26	15.4	8
VI	Arkansas Louisiana New Mexico Oklahoma Texas	10	5.9	3
VII	Iowa Kansas Missouri Nebraska	7	4.1	2
VIII	Colorado Montana North Dakota South Dakota Utah Wyoming	4	2.4	1

TABLE 2. (continued)

EPA Region	States in EPA region	Number of commercial laboratories located in region	Percentage of commercial laboratories located per region	Number of commercial laboratories surveyed per region
IX	Arizona California Hawaii Nevada	20	11.8	6
X	Alaska Idaho Oregon Washington	5	3.0	1
	TOTAL	169	99.9	50

SECTION 3

RESULTS AND DISCUSSION

The results of Bulk Sample Rounds 9, 10, 11, and Blind Round II are described in this section. The total number of laboratories participating in each round is listed in the introductory paragraph of each round along with a summary of the laboratory's analytical results. In addition, a description of the bulk material samples used in each round is provided.

3.1 BULK SAMPLE ROUND 9

Round 9 samples were distributed on April 27, 1984. Four bulk samples were sent to a total of 254 participating laboratories (176 commercial and 78 noncommercial). Quantitative results were available for 237 laboratories (170 commercial and 67 noncommercial).

Samples A and B were prepared for evaluation of quantitative estimates provided by participating laboratories. Samples C and D were obtained from removal projects. Sample A contained 1.8 to 2.0 grams of a mineral wool/calcium carbonate mixture and 8 to 12 milligrams of mine-grade chrysotile. It was estimated to contain 0.40 to 0.66 percent asbestos, by weight. Sample B contained 1.8 to 2.0 grams of the same mineral wool and calcium carbonate mixture used in sample A with 90 to 110 milligrams of mine-grade amosite. Sample B was estimated to contain 4 to 6 percent asbestos, by weight. Sample C contained chrysotile, fibrous gypsum, vermiculite, and calcium carbonate. Sample D contained fibrous glass, cellulose, and calcium carbonate.

The qualitative results for Round 9 are presented in Table 3. Of the 948 samples analyzed in Round 9, 873 (92 percent) were classified correctly while 848 (89 percent) were classified and identified correctly.

Sample A contained less than 1 percent of chrysotile, by weight. As a result of the various analytical techniques utilized during PLM quantitative procedures, 39 of the 237 laboratories (16 percent) that analyzed sample A in Round 9 reported an asbestos concentration between

TABLE 3. ROUND 9 QUALITATIVE RESULTS

Sample ID	Sample contents	Number of samples analyzed	Number of correct classifications	Number of classification errors[b]		Number of identification errors [c]	Total number correctly classified and identified
				False negatives[a]	False positives		
A	Chrysotile, <1% Mineral wool, 40-50% Calcium Carbonate, 50-60% Cellulose, trace	237	186 (78.5%)	0	51	5	181 (97.3%)
B	Amosite, 4-6% Mineral wool, 45-60% Calcium Carbonate, 40-50% Cellulose, trace	237	218 (92.0%)	19	0	15	203 (85.7%)
C	Chrysotile, 1-3% Gypsum, 50-60% Mica, 30-40% Fibrous glass, <1%	237	237 (100.0%)	0	0	5	232 (97.9%)
D	Fibrous glass, 4-8% Cellulose, <1% Calcium Carbonate, >90%	237	232 (97.9%)	0	5	0	232 (97.9%)
	TOTAL	948	873 (92.1%)	19	56	25	848 (89.5%)

[a] Correctly classified as an "asbestos containing material" as described in the Federal Register/Vol. 47, No. 103/Thursday, May 27, 1982/Rules and Regulations/pg. 23370/Section 763.103, Definitions.

[b] Samples may be classified as asbestos-containing (positive) or as nonasbestos (negative). Classification errors are false positives or false negatives.

[c] Identification errors are incorrect designations of the specific type(s) of asbestos present. Identification and classsfication errors are mutually exclusive categories; i.e., incorrect classifications are not counted as identification errors.

one and five percent and 12 laboratories (5 percent) reported an asbestos concentration of greater than 5 percent. Of the 237 laboratories that analyzed sample A in Round 9, 186 (78 percent) reported an asbestos concentration of 1 percent or less.

Considering the variations in analytical procedure, EPA decided that although 186 (78 percent) of the 237 laboratories correctly classified sample A as containing less than one percent asbestos by weight, it would not reduce the remaining 51 (22 percent) laboratories performance ratings. Therefore, a laboratory reporting an asbestos content of 5 percent or less was given credit for sample A. This allowance to 5 percent was misinterpreted by some participating laboratories that EPA had changed it's definition of an asbestos containing material (any material which contains more than 1 percent of asbestos, by weight). In fact, the EPA 1 percent definition of an asbestos containing material had not been changed.

Because of this misunderstanding EPA elected to remove sample A from Round 9. Round 9 is recorded as having only 3 samples, samples B, C, and D. The maximum performance rating for Round 9 is 3/3, depending on your score for samples B, C, and D.

Sample C was commonly misidentified as containing tremolite. However, as noted in section 2.1.5, identification errors are not counted against the laboratories' performance ratings. The distribution of quantitative results for participating laboratories is presented by sample in Appendix D, Figures 1 through 4. Results are mailed to participating laboratories for interlaboratory comparison.

The distribution of performance ratings for Round 9 is presented in Table 4. Of the 237 participating laboratories in Round 9, 191 received a performance rating of 3/3 (no classification errors), 39 a performance rating of 2/3 (one classification error), 6 received a performance rating of 1/3, and 1 received a performance rating of 0/3.

TABLE 4. ROUND 9 PERFORMANCE RATINGS

Performance rating	Classification errors	Number of identification errors 0	1	2	Number of laboratories
3/3	0	179	11	1	191 (80.6%)
2/3	1	30	8	1	39 (16.5%)
1/3	2	4	2	0	6 (2.5%)
0/3	3	1	0	0	1 (0.4%)
		214	21	2	237

3.2 BULK SAMPLE ROUND 10

Round 10 samples were distributed on September 7, 1984. Four samples were sent to a total of 320 participating laboratories (223 commercial and 97 noncommercial). Results were returned by 282 laboratories (197 commercial and 85 noncommercial).

All of the bulk materials distributed in Round 10 were real-world samples. Sample A contained chrysotile (8 - 13 percent), perlite, and gypsum. Sample B contained chrysotile (50 - 60 percent) and cellulose fibers. Sample C contained cellulose, and Sample D contained fibrous glass with small amounts of mica and carbonate. Neither sample C or D contained asbestos.

The qualitative results for Round 10 are presented in Table 5. Of the 1,128 samples returned in Round 10, 1,096 (97 percent) were classified correctly while 1,082 (96 percent) were classified and identified correctly.

TABLE 5. ROUND 10 QUALITATIVE RESULTS

Sample ID	Sample contents	Number of samples analyzed	Number of correct classifications[a]	Number of classification errors[b]		Number of identification errors[c]	Total number correctly classified and identified
				False negatives	False positives		
A	Chrysotile, 8-13% Gypsum, 50-60% Perlite, 30-40%	282	261 (92.6%)	21	0	8	253 (89.7%)
B	Chrysotile, 50-60% Cellulose, 40-50%	282	280 (99.3%)	2	0	6	274 (97.2%)
C	Cellulose, >99% Gypsum, <1% Quartz, <1%	282	274 (97.2%)	0	8	0	274 (97.2%)
D	Fibrous glass, >97% Mica & carbonate, <3%	282	281 (99.6%)	0	1	0	281 (99.6%)
	TOTAL	1128	1096 (97.2%)	23	9	14	1082 (95.9%)

[a] Correctly classified as an "asbestos containing material" as described in the Federal Register/Vol. 47, No. 103/Thursday, May 27, 1982/Rules and Regulations/pg. 23370/Section 763.103, Definitions.

[b] Samples may be classified as asbestos-containing (positive) or as nonasbestos (negative). Classification errors are false positives or false negatives.

[c] Identification errors are incorrect designations of the specific type(s) of asbestos present. Identification and classification errors are mutually exclusive categories; i.e., incorrect classifications are not counted as identification errors.

The distribution of quantitative results for the participating laboratories is presented by sample in Appendix D, Figure 5 through 8. This information is supplied to the participating laboratories to enable them to compare their quantitative results with those of others. Again, quantitative results are not used in determining a laboratory's performance rating.

The distribution of performance ratings for Round 10 is presented in Table 6. Out of the 282 laboratories participating in Round 10, 253 received a performance rating of 4/4 (no classification errors), 26 received a performance rating of 3/4 (1 classification error), and 3 laboratories received a performance rating of 2/4 (two classification errors). The laboratories scoring 4/4 recorded six single and two double identification errors, and the laboratories scoring 3/4 recorded three single identification errors. Of the three laboratories scoring 2/4, only one made a single identification error.

TABLE 6. ROUND 10 PERFORMANCE RATINGS

Performance rating	Number of classification errors	Number of identification errors			Number of laboratories
		0	1	2	
4/4	0	245	6	2	253 (89.7%)
3/4	1	23	3	0	26 (9.2%)
2/4	2	2	1	0	3 (1.1%)
		270	10	2	282

3.3 BULK SAMPLE ROUND 11

Round 11 samples were distributed on November 12, 1984. Four bulk samples were sent to a total of 318 participating laboratories (224 commercial and 94 noncommercial laboratories). Laboratory reports were returned by a total of 278 laboratories (198 commercial and 80 noncommercial).

Sample A contained 100 percent fibrous glass that had been dyed red. Sample B contained approximately 98 percent mine-grade crocidolite with 2 percent opaque complementary minerals. Sample C contained >98 percent pyrophyllite and <2 percent lime. Pyrophyllite is used in refractories, asphalt fillers, joint compounds, paints, roofing materials, and wallboard. Sample D was 100 percent carbon fibers. Carbon fibers are being used with increasing frequency to strengthen materials as production costs come down and applications increase.

Sample C was selected because it is easily confused with anthophyllite or tremolite-actinolite asbestos. The refractive indices of pyrophyllite are lower and the birefringence is higher than corresponding properties of anthophyllite or tremolite-actinolite.

The qualitative results for Round 11 are presented in Table 7. Of the 1,112 samples returned in Round 11, 1,055 (95 percent) were classified correctly while 1,041 (94 percent) were classified and identified correctly.

There were five classification errors of Sample A, which is attributed to the laboratories indicating that chrysotile was present. The three classification errors in sample B indicated that the sample contained either fiberglass or was listed as being "other" material. Sample C was commonly classified as containing actinolite, anthophyllite, or tremolite and, to a lesser extent, chrysotile. The laboratory misclassifying carbon fibers, indicated that the sample contained crocidolite.

The 14 identification errors recorded for sample B indicated primarily amosite to be present rather than mine-grade crocidolite. To a lesser extent, laboratories indicated that unspecified materials were present. One laboratory indicated chrysotile to be present.

Quantitative results for participating laboratories are presented in Appendix D, Figures 9 through 12. This information is provided to participating laboratories for interlaboratory comparison although these data are not used in determining performance ratings.

TABLE 7. ROUND 11 QUALITATIVE RESULTS

Sample ID	Sample contents	Number of samples analyzed	Number of correct classifications[a]	Number of classification errors[b]		Number of identification errors[c]	Total number correctly classified and identified
				False negatives	False positives		
A	Fibrous glass, 100%	278	273 (98.2%)	0	5	0	273 (98.2%)
B	Crocidolite, >98% Opaques, carbonates, and trace unidentified phases, <2%	278	275 (98.9%)	3	0	14	261 (93.9%)
C	Pyrophyllite, >98% Lime, <2%	278	230 (82.7%)	0	48	0	230 (82.7%)
D	Carbon fibers, 100%	278	277 (99.6%)	0	1	0	277 (99.6%)
	TOTAL	1112	1055 (94.9%)	3	54	14	1041 (~~98.7%~~)

[a] Correctly classified as an "asbestos containing material" as described in the Federal Register/Vol. 47, No. 103/Thursday, May 27, 1982/Rules and Regulations/pg. 23370/Section 763.103, Definitions.

[b] Samples may be classified as asbestos-containing (positive) or as nonasbestos (negative). Classification errors are false positives or false negatives.

[c] Identification errors are incorrect designations of the specific type(s) of asbestos present. Identification and classification errors are mutually exclusive categories; i.e., incorrect classifications are not counted as identification errors.

The distribution of the performance ratings for Round 11 is presented in Table 8. Of the 278 laboratories participating in Round 11, 223 received a performance rating of 4/4 (no classification errors), 53 received a performance rating of 3/4 (one classification error), (and 2 received a performance rating of 2/4.

TABLE 8. ROUND 11 PERFORMANCE RATINGS

Performance rating	Number of classification errors	Number of identification errors			Number of laboratories
		0	1	2	
4/4	0	213	10	0	223 (80.2%)
3/4	1	49	4	0	53 (19.1%)
2/4	2	2	0	0	2 (0.7%)
		264	14	0	278

3.4 BLIND ROUND II

Three bulk asbestos samples were sent to each of the commercial laboratories participating in the second blind round. Sample A contained mixed amosite and chrysotile (80 percent). Sample B contained layered amosite and chrysotile (>95 percent). Sample C contained mixed cellulose, graphite fibers, vermiculite. The bulk materials used in Samples A, B, and C were furnace insulation, ceiling material, and pipe insulation, respectively. Each material was previously used as a bulk material sample in the U.S. Environmental Protection Agency's Bulk Asbestos Sample Quality Assurance Program.

A laboratory's analytical results were evaluated based on it's ability to determine (1) if the bulk material contained 1 percent or more of asbestos and (2) what type(s) of asbestos (amosite and/or chrysotile) the bulk material contained.

Two of the 50 laboratories selected for the second blind round did not participate in the round. One laboratory refused to accept the bulk samples because the laboratory manager thought the RTI surveyor was trying to secure evidence for a pending court case. The second laboratory was nonresponsive (the laboratory report for the analysis of the bulk samples was never sent to the RTI surveyor, after repeated callings over the time period of August 1984 through November 1984).

The qualitative results for the second blind round are presented in Table 9. Of the 144 bulk samples analyzed, 143 (99.3 percent) were classified correctly. A misclassification (false positive) was reported in one sample (Sample C) and the type of asbestos was incorrectly identified in 29 samples (Samples A and B).

For Sample A, all 48 of the participating commercial laboratories correctly classified the bulk material as containing greater than 1 percent asbestos, by weight. Of these 48 laboratories, 39 correctly identified both amosite and chrysotile in the sample. Eight identification errors resulted because the laboratories reported only one of the two types of asbestos present in the sample. This result implies that some laboratories are not conducting a thorough examination of the bulk samples. One laboratory reported that Sample A contained anthophyllite (not amosite or chrysotile), resulting in an additional two identification errors, for a sample total of 10.

For Sample B, all 48 of the participating commercial laboratories correctly classified the bulk material as containing greater than 1 percent asbestos. Of these 48 laboratories, 29 correctly identified the type of asbestos in the sample as amosite and chrysotile. Nineteen identification errors were reported for Sample B. These identification errors resulted when only one of the two types of asbestos present in the sample was reported.

TABLE 9. QUALITATIVE RESULTS FOR THE SECOND BLIND ROUND

Sample ID	Sample contents	Number of samples analyzed	Number of correct classifications	Number of classification errors[b]		Number of identification errors[c]
				False negatives	False positives	
A	Amosite, 50% Chrysotile, 30% Kaolinite, 20%	48	48 (100%)	0	0	10 (20.8%)
B	Amosite, 35-45% Chrysotile, 50-60% Carbonate, <1%	48	48 (100%)	0	0	19 (39.6%)
C	Cellulose, 15-25% Graphite Fiber, <2% Vermiculite, <90%	48	47 (97.9%)	0	1	0 (0%)
	TOTAL	144	143 (99.3%)	0	1	29 (20.1%)

[a] Correctly classified as an "asbestos containing material" as described in the Federal Register/Vol. 4 No. 103/Thursday, May 27, 1982/Rules and Regulations/pg. 23370/Section 763.103, Definitions.

[b] Samples may be misclassified as asbestos-containing (false positive) or as nonasbestos (false negative).

[c] Identification errors are incorrect designation of the specific type of asbestos present. Identification and classification errors are mutually exclusive categories; i.e., incorrect classifications are not counted as identification errors.

For Sample C, 47 of the 48 participating laboratories correctly classified the bulk material as containing less than 1 percent asbestos. One laboratory misclassified Sample C as containing 5 percent amosite.

The distribution of the quantitative results for the participating laboratories in percentage of asbestos reported per sample is presented in Table 10. The quantitative results were not used in determining the laboratory performance rating.

TABLE 10. QUANTATITIVE RESULTS FOR THE SECOND BLIND ROUND

Percentage of asbestos reported	Number of laboratories reporting		
	Sample A	Sample B	Sample C
96 - 100			
86 - 95		5	
76 - 85	3	8	
66 - 75	9	15	
56 - 65	9	6	
46 - 55	8	4	
36 - 45	4	4	
26 - 35	12	3	
16 - 25	2	2	
6 - 15		1	
0 - 5	1		48
TOTAL	48	48	48

The distribution of the performance ratings for the second blind round is presented in Table 11. Of the 48 laboratories participating in the second blind round, 47 achieved a performance rating of 3/3 (no classification errors), and 1 achieved a performance rating of 2/3 (One classification error). The laboratories scoring 3/3 recorded from zero to three identification errors. The laboratory scoring 2/3 had recorded no identification errors.

TABLE 11. PERFORMANCE RATINGS FOR THE SECOND BLIND ROUND

Performance rating	Number of Classification errors	Number of identification errors 0	1	2	3	Number of laboratories
3/3	0	26	14	6	1	47 (97.9%)
2/3	1	1				1 (2.1%)
						Total 48

SECTION 4.0

SUMMARY

Three aspects of analytical technique are considered in QA Rounds 9, 10, and 11. First, the bulk material is classified as either asbestos-containing (greater than 1 percent) or non-asbestos-containing (1 percent or less). Second, the specific type of asbestos (chrysotile, amosite, crocidolite), nonasbestos fibrous material (fibrous glass, cellulose), or nonfibrous material (calcium carbonate, serpentine) in the bulk material is identified. Third, the percentages of asbestos and other major sample constituents are qualified. A performance rating is calculated for each participating laboratory based on the number of bulk samples correctly classified as containing asbestos (greater than 1 percent).

The blind round evaluates commercial laboratories on their ability to determine (1) if a bulk material contains greater than 1 percent of asbestos, and (2) what type of asbestos the bulk material contains. The participating laboratories are randomly selected from the interim listing of Commercial Laboratories with Polarized Light Microscope Capabilities for Bulk Asbestos Identification (see Appendix C). The laboratories participating in the blind round are not aware, at the time of analysis, that the bulk materials originate from RTI under the auspices of EPA's Asbestos-in-Schools Program.

The number of laboratories participating in QA Rounds 9, 10, and 11 were 254, 320, and 318, respectively. The number of classification errors in QA Rounds 9 , 10, and 11 were 75, 32, and 57, respectively. The laboratories participating in the program each received the same four bulk material samples to analyze per QA round.

Fourty-eight commercial laboratories participated in Blind Round II, and only one classification error resulted. Each laboratory participating in the Blind Round received the same three bulk material samples to analyze.

Continuation of the Bulk Sample Analysis Quality Assurance Program is anticipated. Any commercial or noncommercial laboratory that performs PLM analysis of bulk material samples may participate. Currently, two QA Rounds and one Blind Round are planned for each upcoming fiscal year.

Appendix A

Reporting Form, Coding Form, and Instructions

Results Reporting Form

BULK SAMPLE ANALYSIS QUALITY ASSURANCE PROGRAM

Laboratory I.D. #					
Sample I.D. #					
Sample Code Assigned by Laboratory					
Analytical Method (enter number)	1. PLM 2. PLM with dispersion staining 3. PLM + X-ray diffraction				
Gross Sample Appearance	Is the sample homogeneous?				
	Does it contain obvious layers?				
	Is the sample fibrous?				
	Sample color				
Sample Treatment (enter number)	1. None 2. Homogenized 3. Other, *specify*				
Does the Sample Contain Any Asbestos Fibers?					
Asbestos Present (enter number and percent)	1. Amosite 2. Chrysotile 3. Crocidolite 4. Other, *specify*				
Total Percent Asbestos Present in Sample					
Other Fibrous Materials Present (enter number and percent)	1. Fibrous glass 2. Cellulose 3. Other, *specify*				
Nonfibrous Materials Present (description and percent)					

(Continued: Please provide requested information on reverse side of this form.)

Description of Method of Quantitation

Description of Quality Control Program (e.g., #slides/sample, #splits/set, use of QC samples)

Comments

Analyst (signature required): _____

Affirmation: I hereby affirm that the information appearing on this Results Reporting Form was acquired in analyses performed by the organization submitting the results, _____ (name of laboratory); that the analyses were performed by the person whose signature appears above as "Analyst"; that said analyst is an employee or officer of the above-named organization; that the instruments used in the analyses are the property of or are routinely available to said organization; and that the analyses represented by this Results Reporting Form are typical of analytical services available to the public from said organization.

Signature	Title	Date
_____	_____	_____

Address Correction Please: _____

Asbestos Bulk Sample Analysis Quality Assurance Program Results Coding Form

Laboratory I.D.#[a] (4-7) Round #[b] (9-10)

Sample I.D. #[c]	Neg/Pos[d]	Asbestos Fibers Present		Other Fibrous Materials Present		Non-Fibrous Material
12-15	26	Type 1[e] 28-31	Type 2[e] 38-41	Type 1[g] 48-51	Type 2[g] 58-61	Type[h] 68-71
		Percent 1[f] 33-36	Percent 2[f] 43-46	Percent 1[f] 53-56	Percent 2[f] 63-66	Percent[f] 73-76
12-15	26	Type 1[e] 28-31	Type 2[e] 38-41	Type 1[g] 48-51	Type 2[g] 58-61	Type[h] 68-71
		Percent 1[f] 33-36	Percent 2[f] 43-46	Percent 1[f] 53-56	Percent 2[f] 63-66	Percent[f] 73-76
12-15	26	Type 1[e] 28-31	Type 2[e] 38-41	Type 1[g] 48-51	Type 2[g] 58-61	Type[h] 68-71
		Percent 1[f] 33-36	Percent 2[f] 43-46	Percent 1[f] 53-56	Percent 2[f] 63-66	Percent[f] 73-76
12-15	26	Type 1[e] 28-31	Type 2[e] 38-41	Type 1[g] 48-51	Type 2[g] 58-61	Type[h] 68-71
		Percent 1[f] 33-36	Percent 2[f] 43-46	Percent 1[f] 53-56	Percent 2[f] 63-66	Percent[f] 73-76

[a] Laboratory I.D. # is first four digits on each sample.

[b] Round # is middle two digits.

[c] Sample I.D. # is final four digits on each sample.

[d] Negative = ≤ 1% asbestos, enter 0; positive = > 1% asbestos, enter 1.

[e] Enter type(s) of asbestos: AMOS = Amosite, CHRY = Chrysotile, CROC = Crocidolite, ANTH = Anthophyllite, TREM = Tremolite, ACTN = Actinolite, UNSP = unspecified.

[f] Enter percent, note decimal placing.

[g] Enter other fibrous material type(s): CELL = Cellulose, FBGL = Fibrous glass (includes fiberglass and mineral wool), OTHR = other.

[h] Enter predominant non-fibrous material: CACO = Calcium carbonate, CARB = Carbon, CASO = Calcium sulfate (Gypsum), Non-fibrous glass, OTHR = other, UNSP = unspecified or unknown.

NOTE: For materials that do not have an abbreviation, make a four letter abbreviation and explain below.

BULK SAMPLES QUALITY ASSURANCE PROGRAM

Research Triangle Institute

1-800-334-8571, Ext. 5945

INSTRUCTIONS

1. Verify that this kit contains four bulk material samples.

2. If this kit is incomplete or contains open sample packages:
   PHONE: 1-800-334-8571
   ASK FOR: David Pasquini, Ext. 5945

3. Perform a complete analysis of each sample by polarized light microscopy, with or without dispersion staining. X-ray diffraction should be used only as a confirming technique.

4. Results Reporting Form (Front)

   - Record the results of the PLM analysis on the Results Reporting Form.

   - Record the laboratory identification number and sample identification numbers on Results Reporting Form. The space labelled "Sample Code Assigned by Laboratory" should be used to record accession numbers or other sample identifiers used in laboratory records.

   EXAMPLE: Sample Labels: 2750-10-3728
   2750-10-1494
   2750-10-9673
   2750-10-7307

   Laboratory ID #2750

Sample ID#	10-3728	10-1494	10-9673	10-7307

   - Fill in all blocks for each analysis performed, using zeros or "none" where necessary. In categories offering numbered choices, write the correct number in the appropriate block, followed by a percent value or comment. Reporting forms with incomplete information will not be evaluated.

   - Answer the question: "Does the sample contain any asbestos fibers?", either "yes" or "no". Answer "yes" if any asbestos fibers are seen and "no" if none are seen. The answer "yes" is not a statement that the sample is an "asbestos-containing material" (see below).

   - Under "Asbestos Present", report the amount of each type of asbestos present as a percentage of the total material in the sample. Do not report the amount of asbestos as a percentage of fibrous components only. If no asbestos is present, report "None" or "0%". If asbestos is present and the amount is less than or equal to 1 percent, report "trace", "<1%", or "≤1%". If the amount of asbestos in the sample is more than 1 percent, report the amount to be present. In accordance with definitions included in current EPA regulations, an "asbestos-containing material" is defined as any material containing more than 1 percent asbestos. Therefore, samples containing 0 to 1 percent asbestos are negatives, and samples containing more than 1 percent asbestos are positives.

   - The "Total Percent Asbestos Present in Sample" is the sum of the percentages of all asbestos types reported under "Asbestos Present".

   - Report all nonasbestos fibers under "Other Fibrous Materials Present". Report both fiberglass and mineral wool as fibrous glass. Report all plant fibers as cellulose. Identify other nonasbestos fibers if possible. Report the amount of each type of nonasbestos fiber as a percentage of the total material in the sample.

   - Any nonfibrous materials should be identified, if possible, and reported under "Nonfibrous Materials Present". Report the amount of each type of nonfibrous material as a percentage of the total material in the sample.

5. Results Reporting Form (Reverse)

   - Complete the reverse side of the Results Reporting Form.
   - Provide descriptions of the procedures used for quantitative analysis and of the routine quality control measures used for bulk sample analysis. Information provided in previous rounds need not be repeated if still applicable. Additional information regarding sample preparation and analytical procedures may be supplied in the space provided for comments.
   - The analyst's signature is required. Reporting forms submitted without required signatures will not be evaluated.
   - The affirmation states that the results being reported were obtained in analyses performed by the laboratory submitting those results. Complete the statement with the name of the laboratory as it appears in the cover letter address. The signature of the laboratory manager or other company officials responsible for analytical services (the analyst, if applicable) is required. Reporting forms submitted without required signatures will not be evaluated.
   - Please provide changes or corrections in the laboratory mailing address if applicable.

6. Results Coding Form

   Transfer the data from the Results Reporting Form to the Results Coding Form using the codes provided at the bottom of the form. Notice that the percentages are to be recorded underneath the material type in the first four columns. Fill in only those blocks that apply, and leave the others blank. Please print legibly because the data on the Results Coding Form is the data on which your performance rating will be based.

7. Layered Samples

   Often samples of insulation materials will contain more than one "layer" or type of material. When it is apparent that a sample contains more than one layer, each layer should be analyzed separately. For the purposes of this program, assume that each layer comprises an equal volume of the sample, and report only one value for each sample regardless of the number of layers that are present. For example: If a sample is made up of two different layers, and one layer is 60% amosite and the other layer is 40% chrysotile, the correct reporting values would be 30% amosite, 20% chrysotile, and 50% total asbestos.

8. Retain all samples for future reference following receipt of the round results and statistical summary.

9. Return the Results Reporting Form and Results Coding Form by the date indicated in the cover letter. Mail to:

   David A. Pasquini, C.I.H.
   Research Triangle Institute
   Building 6
   Post Office Box 12194
   Research Triangle Park, North Carolina 27709-2194

   LATE RETURNS WILL NOT BE EVALUATED

Appendix B

Sample Report to Laboratories

ASBESTOS BULK SAMPLE ANALYSIS Q.A. PROGRAM
RESULTS OF ROUND 11
JANUARY 11, 1985

Mr. Gene Yonkin
Chemical & Geological Labs of Alaska
5633 B Street
Anchorage, AK 99502

Laboratory
I.D. Number
0102

False Negatives: 0
Flase Positives: 1
Performance Rating: 3/4

Lot & Sample I.D. Number	A) 2812	B) 1023	C) 0431 F_POS	D) 5743
Results from Laboratory Number 0102				
Asbestos (%)		90.0 CROC	10.0 ACTN	
Other Fibrous Material (%)	100.0 OTHR			100.0 FBGL
Nonfibrous Material (%)		10.0 NF	90.0 NF	
Qualitative Results from Reference Laboratory				
Asbestos	NONE	CROC	NONE	NONE
Other Fibrous Material	OTHR	NONE	OTHR	CARB
Nonfibrous Material	NONE	OTHR	CACO	NONE
Summary of Quantitative Results				
Percent Asbestos-Percentiles				
50% - Median (N=274)	0.0	85.0	0.0	0.0
100% - Maximum	90.0	100.0	90.0	99.0
95%	0.0	100.0	20.0	0.0
75%	0.0	95.0	0.0	0.0
25%	0.0	70.0	0.0	0.0
5%	0.0	30.0	0.0	0.0
0% - Minimum	0.0	0.0	0.0	0.0
Percent Other Fibrous Material				
OFM - Median (N)	100.0(261)		10.0(118)	100.0(264)
Percent Nonfibrous Material				
NF - Median (N)		15.0(222)	90.0(253)	

Asbestos Abbreviations
ACTN=Actinolite CROC=CROCIDOLITE
Other Fibrous Material Abbreviations
FBGL=Fibrous Glass CARB= Carbon OTHR=Other
Nonfibrous Material Abbreviations
CACO=Calcium Carbonate

Appendix C

Interim Listing Number 18

Commercial Laboratories with Polarized Light Microscope Capabilities for Bulk Asbestos Identification

Interim Listing
Number 18
EPA Bulk Analysis Round 11

Prepared by:

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

Prepared for

Environmental Monitoring Systems Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Office of Toxic Substances
U.S. Environmental Protection Agency
Washington, DC 20460

March 1985

INTRODUCTION

The following laboratories participated in the current round of the U.S. Environmental Protection Agency's (EPA) bulk asbestos sample quality assurance program. Laboratories are listed with their performance scores for this and previous rounds in which they participated. Laboratory performance was assessed on the basis of correct identification of "positive" (containing >1 percent asbestos) and "negative" (containing <1 percent asbestos) samples. Reductions of correct scores (3/3, 4/4, or 8/8) were made only for the reporting of false positives (nonasbestos sample reported as containing >1 percent asbestos) or false negatives (1 percent or less asbestos reported in an asbestos-containing sample), and not for the misidentification of individual asbestos mineral species. Although the criterion is lenient, it recognizes the basic concern of the public--the presence or absence of asbestos fibers in a submitted sample. Four separate bulk samples were sent to each laboratory in Rounds 1, 2, 4, 5, 6, 7, 8, 10, and 11; eight were sent in Round 3. Three samples were evaluated in Round 9. All analyses were performed by polarized light microscopic (PLM) analysis. Where numerical evaluations are omitted, an alphabetical character is included to reference the description below.

Letter	Description
D	The laboratory was disqualified in that round.
N	The laboratory received samples but did not participate in the round.
P	The laboratory participated as a noncommercial laboratory; performance scores therefore are not reported.
U	The laboratory did not receive samples in that round.

The quality assurance program is not designed for laboratory accreditation and does not certify or endorse participating laboratories. This list of program participants is provided as a source of analytical laboratories by the EPA Asbestos-in-Schools Program. Updated lists of participating laboratories and further information on the quality assurance program, sampling and analysis of asbestos-containing materials, and the EPA Asbestos-in-Schools Program is available from the Asbestos Technical Information Service at (800)334-8571 (Extension 6741).

REGION 1

Mr. Jim Kenny
Aetna Insurance Company
Environmental Health Laboratory
94 Murphy Road
Hartford, CT 06114
203/522-3814

RND 1: U RND 2: U RND 3: U
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 3/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. Harold C. Kraus
Environmental Technology
P. O. Box 127
West Hartford, CT 06107
203/521-6820

RND 1: U RND 2: 4/4 RND 3: D
RND 4: N RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. Edward B. Engel
Aetna Life & Casualty, Engineering Div.
Environmental Health Unit
151 Farmington Avenue
Hartford, CT 06156
203/273-3445

RND 1: U RND 2: U RND 3: 6/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 2/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. Wiech
Environmental Associates, Inc.
P. O. Box 224
Fairfield, CT 06430
203/259-6142

RND 1: U RND 2: U RND 3: U
RND 4: 3/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 3/4

Ronald E. McCullen
Travelers Insurance-Engr Lab
248 Continental Plaza
Hartford, CT 06115
203/277-7533

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Sally E. Reffner
TAKA
97 Ocean Drive East
Stamford, CT 06902
203/356-8977

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Stephan W. Campbell-ESU L
Hartford Insurance Group
Hartford Plaza
Hartford, CT 06115
203/547-4557

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

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REGION 1

Thomas F. Hatch Peck Laboratories, Inc. P. O. Box 947 Kennebunk, ME 04043 207/985-6116	RND 1: U RND 4: U RND 7: U RND10: 3/4	RND 2: U RND 5: U RND 8: U RND11: 3/4	RND 3: U RND 6: U RND 9: N
Ms. Mary Kozik GCA Technology Division 213 Burlington Road Bedford, MA 01730 617/275-5444	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: N RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Cathy L. Oakes K-Chem Laboratories 46 Clayton Street Boston, MA 02122 617/436-7181	RND 1: U RND 4: U RND 7: N RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3
Ralph Berger Skinner & Sherman Lab 300 2nd Avenue, Box 521 Waltham, Ma 02254 617/890-7200	RND 1: U RND 4: U RND 7: 3/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Mr. Robert L. MacDonald Eastern Analytical Laboratories, Inc. 149 Rangeway Road Billerica, MA 01862 617/272-5212	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
James E. Dennison Dennison Environmental P. O. Box 2526 Woburn, MA 01888 617/938-8508	RND 1: U RND 4: U RND 7: U RND10: U	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: U
Glen Sylvester Certified Engineering & Testing Co. Inc. 166 Schoosett Street Pembroke, MA 02359 617/826-7336	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3

REGION 1

Fred Boyle
Hub Testing Laboratory
95 Beaver Street
Waltham, MA 02154
617/893-8330

RND 1: U	RND 2: U	RND 3: U
RND 4: 3/4	RND 5: 4/4	RND 6: N
RND 7: 3/4	RND 8: 4/4	RND 9: 2/3
RND10: N	RND11: 4/4	

Mr. James Litrides
Briggs Associates Inc.
400 Hingham Street
Rockland, MA 02370
617/871-6040

RND 1: U	RND 2: 3/4	RND 3: 8/8
RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 3/4	

Thomas E. Veratti
CON-TEST, Inc.
105 Hillside Drive
East Longmeadow, MA 01028
413/525-1198

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: U	RND 8: U	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

Dr. Spooner
Hygeia, Inc.
1380 B Main Street
Waltham, MA 02154
617/647-9475

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: U	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 3/4	

Samual J. Covino
ESA
43 Wiggins Avenue
Bedford, MA 01730
617/275-0100

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: 4/4
RND 7: 3/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

Dr. Fred E. Tibbetts
Tibbetts Engineering Corporation
210 Deane Street
New Bedford, MA 02746
617/996-5633

RND 1: U	RND 2: U	RND 3: 8/8
RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
RND10: 3/4	RND11: 4/4	

Dr. Robert J. Emerson
Shelburne Laboratories, Inc.
P. O. Box 458
Shelburne, VT 05482
802/425-3438

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: U	RND 8: U	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

REGION 2

Mr. Joseph E. Wilson Environmental Health Protection Consultants, Inc. 46 Ivy Lane Cherry Hill, NJ 08002 609/779-1372	RND 1: U RND 4: 4/4 RND 7: 3/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 3/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Gordon K. Yetter Alternative Ways, Inc. RD 2 - Box 205 Colony Place Swedesboro, NJ 08085 609/871-5538	RND 1: U RND 4: U RND 7: 2/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: N RND 9: 3/3
J. Sheraard S-R Analytical, Inc. 28 Springdale Road P.O. Box 4201 Cherry Hill, NJ 08003 609/541-6700	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: N
James F. McVeigh Atlantic Environmental Inc. 112 Main Road Montville, NJ 07045 201/335-5756	RND 1: U RND 4: U RND 7: 3/4 RND10: 3/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Douglas Campbell PSE & G Research Corporation 200 Boyden Avenue Maplewood, NJ 07040 201/761-1390	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 3/4	RND 3: U RND 6: U RND 9: U
Kirit H. Vora Clayton Environmental Consultants, Inc. 160 Fieldcrest Avenue Raritan Center Edison, NJ 08837 201/225-6040	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 3/4 RND 5: 4/4 RND 8: 4/4 RND11: 3/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
John E. Stillman Exxon Corp. Industrial Hyg. Analytical Service Lab. P. O. Box 235, Mettlers Rd. East Millstone, NJ 08873	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3

REGION 2

Ms. Jane Clarke-James Testwell-Craig Testing Laboratories 565 East Harding Highway Mays Landing, NJ 08330 609/625-1700	RND 1: N RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 3/4	RND 3: 7/8 RND 6: N RND 9: N
J. Stephen Duerr Structure Probe, Inc. 230 Forrest Street Metuchen, NJ 08840 201/549-9350	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Dr. Sor Shimel and Sor Testing Laboratories P. O. Box 78 East Hanover, NJ 07936 201/887-8808	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 3/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 2/3
James J. Weitzman Kaselaan & D'Angelo Associates, Inc. 215 White Horse Pike Haddon Heights, NJ 08035 609/227-7841	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Mr. W. B. Rossnagle Rossnagle and Associates, Inc. 234 Route 70 Medford, NJ 08055 609/654-1441	RND 1: N RND 4: N RND 7: I RND10: I	RND 2: N RND 5: N RND 8: I RND11: 3/4	RND 3: D RND 6: I RND 9: I
David Kichula Princeton Testing Laboratory P. O. Box 3108 Princeton, NJ 08540 609/452-9050	RND 1: 3/4 RND 4: N RND 7: I RND10: 4/4	RND 2: 3/4 RND 5: I RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: I RND 9: 3/3
Gary Hahn Ecology & Environmental, Inc. P. O. Box D, 195 Sugg Road Buffalo, NY 14225 716/631-0360	RND 1: U RND 4: U RND 7: 3/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 2/4	RND 3: U RND 6: 4/4 RND 9: 3/3

REGION 2

Mr. Thomas A. Kubic TAKA Asbestos Analytical Services P. O. Box 208 Greenlawn, NY 11740 516/261-2117	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Dr. Malcolm Newman Inter-City Testing & Consulting Corp. 159 Great Neck Road Great Neck, NY 11021 516/829-8762	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Doug Friend Friend Laboratory, Inc. 446 Braod Street Waverly, NY 14892 1445 607/565-2893	RND 1: U RND 4: U RND 7: 2/4 RND10: 3/4	RND 2: U RND 5: U RND 8: 3/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 2/3
Ronald Bielinski Adelaide Envr Health Associates 142 Riverside Drive Binghamton, NY 13905 607/722-6839	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: U
Ved P. Kukreja Enviro-Probe, Inc. 1424 Williamsbridge Road Bronx, NY 10461 212/863-0045	RND 1: U RND 4: U RND 7: N RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11 4/4	RND 3: U RND 6: U RND 9: 3/3
Eva Galson Galson Technical Services 6601 Krikville Road East Syracuse, NY 13057 315/437-7181	RND 1: U RND 4: 4/4 RND 7: /4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Dr. Jesse H. Bidanset J. H. Bidanset & Associates 167 Willis Avenue Mineola, NY 11501 516/747-8400	RND 1: 4/4 RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3

REGION 2

Mr. John Gaspari	RND 1: U	RND 2: U	RND 3: 8/8
New York Testing Laboratory	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
81 Urban Avenue	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Westbury, NY 11590	RND10: 4/4	RND11: 4/4	
516/334-7770			

Susan Marie Viet	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
KEMRON	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
755 New York Avenue	RND 7: 3/4	RND 8: 4/4	RND 9: 3/3
Huntington, NY 11743	RND10: 4/4	RND11: 4/4	
516/427-0950			

REGION 3

Naresh C. Batta
Batta Environmental Associates
P. O. Box 9722
Newark, DE 19714 9722
302/737-3376

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: 4/4 RND11: 4/4

Raymond C. Crippen, Ph.D.
Crippen Laboratories, Inc.
4027 New Castle Avenue
New Castle, DE 19720
302/571-8882

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: N RND 8: 3/4 RND 9: 2/3
RND10: 4/4 RND11: 3/4

Gary A. Hayes
V. J. Schuler Associates, Inc.
P. O. Box 138
Middletown, DE 19709
302/378-9881

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: U RND11: 4/4

Mr. Frank Fitzpatrick
Biospherics, Inc.
4928 Wyaconda Road
Rockville, MD 20852
301/770-7700

RND 1: U RND 2: 4/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 3/4

Camille J. Carraway
Oneil M. Banks Inc.
125 N. Main Street
Bel Air, MD 21614
301/879-4676

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: 3/3
RND10: 4/4 RND11: 3/4

Michael Cirri
Aerosol Monitoring and Analysis, Inc.
246 Cockeysville Road
P. O. Box 687
Hunt Valley, MD 21030
301/666-5105

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 3/4

Marc Halpern
Tracor Jitco, Inc.
1601 Research Blvd.
Rockville, MD 20850
301/984-2800

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: 4/4 RND 9: N
RND10: 4/4 RND11: 4/4

REGION 3

Mr. Mark R. Banister
Microbac, Inc.
Erie Testing Laboratory Division
2401 W. 26th St.
Erie, PA 16506
814/833-4790

RND 1: 4/4 RND 2: 3/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

John M. Lang
Universial Laboratories
P. O. Box 58040
Pittsburgh, PA 15209
412/821-5411

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: 4/4 RND11: 3/4

Mr. G. E. Williams
Pittsburgh Testing Laboratory
850 Poplar Street
Pittsburgh, PA 15220
412/922-4000

RND 1: U RND 2: D RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Frank J. Kernozek
Betz Converse Murdoch Laboratory
521 W. Germantown Pike
Norristown, PA 19401
215/825-0447

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 3/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Richard L. Mason
FREE-COL Division
Freeport Brick Company
P. O. Box 557, Cotton Road
Meadville, PA 16335
814/724-6242

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. Spensor Watts
Spotts, Stevens, & McCoy
345 N. Wyomissing Blvd.
Wyomissing, PA 19610
215/376-6581

RND 1: U RND 2: U RND 3: N
RND 4: I RND 5: I RND 6: I
RND 7: I RND 8: I RND 9: I
RND10: 4/4 RND11: 3/4

Barbara J. Felty
Lancaster Laboratories Inc.
2425 New Holland Pike
Lancaster, PA 17601
717/656-2301

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

REGION 3

Dr. Roy S. Anderson Comprehensive Chemical Consulting 514 Concord Dr. Broomall, PA 19008 215/353-3015	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Marianne C. Kaschak Industrial Health Foundation, Inc. 34 Penn Circle West Pittsburgh, PA 15206 412/363-6600	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Nancy Kotsko Air Quality Services 4527 Clairton Boulevard Pittsburgh, PA 15236	RND 1: U RND 4: N RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 3/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Ellie Chapman Industrial Hygiene & Occup. Med Lab A Division of American Medical Lab, Inc. 11091 Main Street Fairfax, VA 22030 703/691-9100	RND 1: U RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
W. Corey Thompson Versar Inc. 6850 Versar Center Springfield, VA 22151 703/750-3000	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3
Edwin Cox, III Commonwealth Laboratory, Inc. Chemists Building 2209 East Broad Street Richmond, VA 23223 804/648-8358	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3
Kent Schoemaker Industrial Hygiene Laboratory Newport News Shipbuilding 4101 Washington Avenue Newport News, VA 23607 804/380-2000	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3

REGION 3

Dr. Joseph H. Guth
Interscience Research
2614 Wyoming Avenue
Norfolk, VA 23513
804/853-8813

RND 1: 4/4 RND 2: 3/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. James Calpin
Analytics
P.O. Box 25249
Richmond, VA 23260
804/353-8973

RND 1: U RND 2: U RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Steven R. Pond
Environmental Laboratories, Inc.
103 S. Leadbetter Road
Ashland, VA 23005
804/798-1589

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. Robert Walker
Marine Chemist Service, Inc.
P. O. Box 6257
Newport News, VA 23606
804/877-9933

RND 1: U RND 2: U RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 3/4

John Connover
263 Simpkins Ct.
Mechanicsville, VA 23111
804/746-7820

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: N
RND10: 4/4 RND11: 4/4

REGION 4

Dr. Charles Ray, Jr.
Safety and Environmental Affairs
300 Nuclear Science Bldg.
Auburn University
Auburn, AL 36849
205/826-4870

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mr. M. A. Beg
American Microscopy Laboratory
29 Heritage Hills
Tuscaloosa, AL 35406
205/345-2555

RND 1: 4/4 RND 2: 3/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Jack E. Davis
Tuscaloosa Testing Laboratory, Inc.
3516 Greensboro Avenue
P. O. Box 1094
Tuscaloosa, AL 35403
205/345-0816

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

James C. Sciple
Thompson Engineering Testing
3707 Cottage Hill Road
P. O. Drawer 9637
Mobile, AL 36609
205/666-2443

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Randy Ogle
Safe State Program
University of Alabama
P. O. Box 6005
Tuscaloosa, AL 35486
205/348-7136

RND 1: U RND 2: U RND 3: U
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

H. Kenneth Dillon
Southern Research Institute
2000 Ninth Avenue South
P. O. Box 55305
Birmingham, AL 35255-5305
205/323-6592

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Steven E. Jones
Applied Technology Consultants
1800-B Airport Road
Opelika, AL 36801
205/749-6366

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

REGION 4

Bruce Wilson	RND 1: U	RND 2: U	RND 3: U
Southern Earth Sciences, Inc.	RND 4: U	RND 5: U	RND 6: 4/4
P. O. Box 160745	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Mobile, AL 36616	RND10: 4/4	RND11: 4/4	
205/476-5077			
Bruce B. Ferguson	RND 1: U	RND 2: U	RND 3: U
Harmon Engineering & Testing	RND 4: U	RND 5: U	RND 6: 4/4
Auburn Industrial Park	RND 7: 4/4	RND 8: N	RND 9: 3/3
Auburn, AL 36830	RND10: 4/4	RND11: 4/4	
205/821-9250			
John H. Kilbourn	RND 1: U	RND 2: U	RND 3: U
Consultant	RND 4: U	RND 5: U	RND 6: 4/4
1913 Capri Drive	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Huntsville, AL 35811	RND10: 4/4	RND11: 4/4	
James D. Ray	RND 1: U	RND 2: U	RND 3: 8/8
Chem-Ray	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
P. O. Box 821	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Florence, AL 35631	RND10: 4/4	RND11: 4/4	
205/776-4345			
David Kirby	RND 1: U	RND 2: U	RND 3: U
Kirby Analytical	RND 4: U	RND 5: U	RND 6: U
2109 20TH Street	RND 7: U	RND 8: U	RND 9: U
Northport, AL 35476	RND10: 4/4	RND11: 4/4	
205/333-9023			
Mr. Harry Kreigh	RND 1: U	RND 2: U	RND 3: 7/8
Interscience, Inc.	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
5025 W. Grace Street	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Tampa, FL 33607	RND10: 4/4	RND11: 4/4	
813/879-8611			
Marcia S. Harvey	RND 1: U	RND 2: U	RND 3: 8/8
Thornton Laboratories	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
P.O. Box 2880	RND 7: 3/4	RND 8: 4/4	RND 9: 3/3
Tampa, FL 33601	RND10: 4/4	RND11: 4/4	
813/223-9702			

REGION 4

Joseph M. Kirchmer Technical Services, Inc. 2471 Swan Street Jacksonville, FL 32204 904/353-5761	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 2/3
Charles C. Haury, CIH Environmental Science and Eng., Inc. P. O. Box ESE Gainesville, FL 32602 904/332-3318	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: N
Dr.s Honnorez/Ginsburg Geoscience Consultants, Inc. P. O. Box 341366 Coral Gables, FL 33134 305/446-5801	RND 1: 4/4 RND 4: 4/4 RND 7: 3/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
James R. Burkhalter Environmental Protection Systems, Inc. 7215 Pine Forest Road Pensacola, FL 32504 904/944-0301	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Robert E. Whippo Minerological Consultant 210 Lake Hollingsworth Drive Number 1304 Lakeland, FL 33803	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Richard L. Hatfield Mc Crone Environmental Services, Inc. 5500 Oakbrook Parkway, Suite 200 Norcross, GA 30093 404/449-8461	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Ion Petre Geo-Environmental Services Inc. 3277 Roswell Rd. - Suite 711 Atlanta, GA 30305 404/257-9303	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3

REGION 4

Mr. Gordon LaPean	RND 1: U	RND 2: U	RND 3: 5/8
Dunn Laboratories	RND 4: 4/4	RND 5: N	RND 6: 4/4
717 Edgehill Avenue, N.W.	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Atlanta, GA 30318	RND10: 4/4	RND11: 4/4	
404/873-6159			
Trabue D. Bryans	RND 1: U	RND 2: U	RND 3: U
MacMillan Research, Ltd.	RND 4: U	RND 5: U	RND 6: U
P. O. Box 1305	RND 7: U	RND 8: U	RND 9: U
Marietta, GA 30061	RND10: 4/4	RND11: 4/4	
404/427-3101			
Ms. Alice Farrar	RND 1: U	RND 2: 4/4	RND 3: 8/8
Environmental Health Laboratory	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
1021 Ga. Avenue, 3rd Floor	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Macon, GA 31201	RND10: 4/4	RND11: 4/4	
912/745-4702			
Donald K. Cavin	RND 1: U	RND 2: U	RND 3: U
Cavin Analytical Consultants	RND 4: U	RND 5: U	RND 6: U
P. O. Box 454	RND 7: U	RND 8: U	RND 9: U
Snellville, GA 30278	RND10: U	RND11: 4/4	
404/979-8838			
Charles Greer	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
Law Engineering Testing Co.	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
P.O. Box 13260, Station K	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Atlanta, GA 30324	RND10: 4/4	RND11: 4/4	
404/873-4761			
Kenneth P. Reed, Ph.D.	RND 1: U	RND 2: U	RND 3: U
Northern Kentucky Envoronmental Service	RND 4: U	RND 5: U	RND 6: U
300 Doctors Building	RND 7: U	RND 8: U	RND 9: U
33 East Seventh Street	RND10: 3/4	RND11: 4/4	
Covington, KY 41011			
606/431-6224			
Doug Price	RND 1: U	RND 2: U	RND 3: U
McCoy & McCoy, Inc.	RND 4: U	RND 5: U	RND 6: U
P. O. Box 238	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
85 East Noel Avenue	RND10: 4/4	RND11: 4/4	
Madisonville, KY 42431			
502/821-7375			

REGION 4

Mr. J. Daniel Cooper Metro Service Laboratories 235 East Burnette Street Louisville, KY 40208 502/635-5463	RND 1: U RND 4: 4/4 RND 7: N RND10: 4/4	RND 2: N RND 5: 4/4 RND 8: 3/4 RND11: 4/4	RND 3: N RND 6: 4/4 RND 9: 3/3
Robert C. Tussey, Jr. Kenvirons, Inc. 452 Versailles Road P. O. Drawer V Frankfort, KY 40602 502/695-4357	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
David Kimbrell Hall-Kimbrell Env-Svcs, Inc. 426 S. Lamar Oxford, MS 38655 601/236-2020	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Thomas J. Wilson Micro-Methods 5106 Telephone Road Pascagoula, MS 39567 601/769-7774	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 3/4 RND11: 3/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Dr. Corbin McGriff Environmental Protection Systems, Inc. P. O. Box 20382 Jackson, MS 39209 601/922-8242	RND 1: U RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Larry Laird Northrop Services, Inc. Environmental Sciences P. O. Box 12313 RTP, NC 27709 919/549-0611	RND 1: 4/4 RND 4: 4/4 RND 7: 3/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Steven L. Goode PES, Inc. 1905 Chapel Hill Road Durham, NC 27707 919/493-3536	RND 1: U RND 4: U RND 7: U RND10: U	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: U

REGION 4

Reginald C. Jordan, CIH Envirosciences, Inc. 3120 Julian Dr. Raleigh, NC 27604 919/876-9722	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Mr. John Sheats Quality Analytical Services 4701 Joseph Michael Court Raleigh, NC 27606 919/851-2891	RND 1: U RND 4: 4/4 RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Larry Thompson Thompson & Associates P. O. Box 766 Folly Beach, SC 29439 803/588-9155	RND 1: U RND 4: U RND 7: 1/4 RND10: 3/4	RND 2: U RND 5: 4/4 RND 8: 3/4 RND11: 2/4	RND 3: U RND 6: N RND 9: 2/3
Patrick H. Cooper Industrial Insulation Co., Inc. P. O. Box 5312 N. Charleston, SC 29406 803/747-3629	RND 1: U RND 4: U RND 7: 4/4 RND10: N	RND 2: U RND 5: N RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Richard D. Bennett Azimuth, Inc. 188 Bridge Creek Drive Goose Creek, SC 29445 803/797-6297	RND 1: U RND 4: U RND 7: U RND10: U	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: U
Kathy Turner Phoenix Environmental Corp. Box 121555 Nashville, TN 37212 615/833-1332	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: U

REGION 5

Cynthia Darling	RND 1: U	RND 2: U	RND 3: U
Cencon	RND 4: U	RND 5: U	RND 6: U
333 South Wabash Avenue - 3W	RND 7: U	RND 8: 4/4	RND 9: 3/3
Chicago, IL 60604	RND10: 4/4	RND11: 4/4	
Richard Karuhn	RND 1: U	RND 2: U	RND 3: U
Particle Data Laboratories, Ltd.	RND 4: U	RND 5: 4/4	RND 6: 4/4
115 Hahn Street	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Elmhurst, IL 60126	RND10: 4/4	RND11: 3/4	
312/832-5658			
Gary Kentgen	RND 1: U	RND 2: U	RND 3: U
Anabestics/GK Consultants	RND 4: U	RND 5: U	RND 6: U
407 West Eugenie Street	RND 7: U	RND 8: U	RND 9: U
Chicago, IL 60614	RND10: U	RND11: 4/4	
312/944-3132			
Dr. Stephen Hall	RND 1: U	RND 2: U	RND 3: 7/8
American Industrial Laboratory	RND 4: 2/4	RND 5: 4/4	RND 6: N
P. O. Box 627	RND 7: 2/4	RND 8: 4/4	RND 9: 2/3
Edwardsville, IL 62025	RND10: 3/4	RND11: 3/4	
618/259-8776			
Mr. Kirk Sweetland	RND 1: U	RND 2: U	RND 3: 8/8
R. A. I. Laboratories	RND 4: 4/4	RND 5: 4/4	RND 6: 3/4
8901 N. Industrial Road	RND 7: N	RND 8: 4/4	RND 9: 3/3
Peoria, IL 61615	RND10: 4/4	RND11: 4/4	
309/692-4422			
Ms. Joan Wronski	RND 1: U	RND 2: 3/4	RND 3: 8/8
NATLSCO	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
Environmental Science Laboratory, A-1	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Long Grove, IL 60049	RND10: 4/4	RND11: 4/4	
312/540-2488			
Dr. Ian Stewart	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
McCrone Environmental Services, Inc.	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
2820 South Michigan Ave.	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Chicago, IL 60616	RND10: 4/4	RND11: 4/4	
312/842-7100			

REGION 5

James F. Dallmeyer
Daily Analytical Laboratories
7807 N. Pioneer Lane
Peoria, IL 61615
309/692-5252

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: 3/3
RND10: 4/4 RND11: 4/4

Fay Goldblatt
Fay Goldblatt Laboratories, Inc.
910 W. Clayton Street
Waukegan, IL 60085
312/249-1745

RND 1: 4/4 RND 2: 4/4 RND 3: 7/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Debra Rickel
Environmental Research Group
117 North First Street
Ann Arbor, MI 48104
313/662-3104

RND 1: U RND 2: U RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 3/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Mark De Lisle
Industrial Hygiene Consultants
5741 Utah
Portage, MI 49002
616/382-3815

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: 3/3
RND10: 4/4 RND11: 4/4

Gail Seifkin
IHI Kemron Environmental Services
32740 N. Western Highway
Farmington Hills, MI 48018
313/626-2426

RND 1: U RND 2: U RND 3: U
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: N
RND10: 4/4 RND11: 4/4

Fred Hoitash
Canton Analytical Laboratory
153 Elder Street
Ypsilanti, MI 48197
313/483-7430

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: 4/4 RND11: 4/4

Mr. Bob Lieckfield
Clayton Environmental Consultants, Inc.
25711 Southfield Road
Southfield, MI 48075
313/424-8860

RND 1: 4/4 RND 2: 4/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

REGION 5

Mr. Donald J. Larsen	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
The St. Paul Insurance Company	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
494 Metro Square Building	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
7th and Robert Streets	RND10: 4/4	RND11: 4/4	
St. Paul, MN 55101			
612/221-7043			
Mr. Michael L. Boucher	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
MJH Mineralogical Consultants, Inc.	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
13345 Foliage Avenue	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Apple Valley, MN 55124	RND10: 4/4	RND11: 4/4	
612/432-8836			
William F. Welbes	RND 1: U	RND 2: U	RND 3: U
Twin City Testing & Engr Lab, Inc.	RND 4: U	RND 5: U	RND 6: U
662 Cromwell Ave.	RND 7: U	RND 8: U	RND 9: N
St. Paul, MN 55114	RND10: 4/4	RND11: 4/4	
612/645-3601			
Terrence Skelton	RND 1: U	RND 2: U	RND 3: U
MWL8, Inc.	RND 4: U	RND 5: U	RND 6: U
101 Peeaby Lane	RND 7: U	RND 8: U	RND 9: 3/3
Wayzata, MN 55391	RND10: 4/4	RND11: 3/4	
612/473-5531			
Phillip Hayden	RND 1: U	RND 2: U	RND 3: U
Pollution Control Scientific Inc.	RND 4: U	RND 5: U	RND 6: N
6015 Manning Road	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Miamisburg, OH 45342	RND10: 4/4	RND11: 4/4	
513/866-5908			
Mr. Craig Caldwell	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
PIE Associates, Inc.	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
11499 Chester Road	RND 7: 4/4	RND 8: 3/4	RND 9: 3/3
Cincinnati, OH 45246	RND10: 4/4	RND11: 4/4	
513/782-4700			
Mr. Tom Eggers	RND 1: U	RND 2: U	RND 3: 6/8
Lyle Laboratories	RND 4: N	RND 5: 4/4	RND 6: 4/4
1327 King Avenue	RND 7: 4/4	RND 8: N	RND 9: 3/3
Columbus, OH 43212	RND10: N	RND11: 4/4	
614/488-1022			

REGION 5

Richard E. Moore
American Analytical Laboratories
100 Lincoln Street
Akron, OH 44308

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: 3/4 RND11: 4/4

S. H. Gelles
S. H. Gelles Associates
2836 Fisher Road
Columbus, OH 43204
614/276-2957

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: U
RND10: U RND11: 4/4

Sandra Kulik
Howard Laboratories
P. O. Box 369
Dayton, OH 45449
513/294-6856

RND 1: U RND 2: U RND 3: N
RND 4: N RND 5: N RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

George L. Quisno
Bowser-Morner Testing Laboratories, Inc.
420 Davis Avenue
P. O. Box 51
Dayton, OH 45401
513/253-8805

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

Bill Zimmerlin
Z-Con Inc.
P. O. Box 576
Vandalia, OH 45377
513/882-1226

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: U
RND 7: U RND 8: U RND 9: 3/3
RND10: 4/4 RND11: 4/4

D. R. Allenson, PhD
Analytical Services Division
Herron Testing Laboratories, Inc.
5405 E. Schaaf Road
Cleveland, OH 44131
216/524-1450

RND 1: 4/4 RND 2: 3/4 RND 3: 8/8
RND 4: 4/4 RND 5: 4/4 RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

G. Pfeifer
Bruce Menkel & Associates, Inc.
235 Industrial Drive
P. O. Box 159
Franklin, OH 45005
513/746-9300

RND 1: U RND 2: U RND 3: U
RND 4: U RND 5: U RND 6: 4/4
RND 7: 4/4 RND 8: 4/4 RND 9: 3/3
RND10: 4/4 RND11: 4/4

REGION 5

Robert Voborsky, Director	RND 1: U	RND 2: U	RND 3: U
Parker Services, Inc.(Sentry Insurance)	RND 4: 3/4	RND 5: 4/4	RND 6: 3/4
1800 N. Point Drive	RND 7: 2/4	RND 8: 4/4	RND 9: 3/3
Stevens Point, WI 54481	RND10: 4/4	RND11: 4/4	
715/346-6804			

Mr. Richard Zimmerman	RND 1: U	RND 2: U	RND 3: 8/8
Wisconsin Occupational Health Laboratory	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
979 Jonathon Drive	RND 7: 4/4	RND 8: 4/4	RND 9: 2/3
Madison, WI 53713	RND10: N	RND11: 4/4	
608/263-8160			

Ms. Carol Gannon	RND 1: U	RND 2: U	RND 3: U
A&G Microscopy	RND 4: 4/4	RND 5: 4/4	RND 6: 3/4
P. O. Box 31	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
Arlington, WI 53911	RND10: 4/4	RND11: 4/4	
608/635-2853			

Mr. Thomas Stavros	RND 1: 4/4	RND 2: 4/4	RND 3: 8/8
Wausau Insurance Companies	RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
Environmental Health Laboratory	RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
2000 Westwood Dr.	RND10: 4/4	RND11: 4/4	
Wausau, WI 54401			
715/845-5211			

REGION 6

Dr. Davy L. Bernard
Acadiana Research Laboratories
University of Southwestern Louisiana
P. O. Box 44210
Lafayette, LA 70504

RND 1: U	RND 2: U	RND 3: U
RND 4: N	RND 5: 4/4	RND 6: 4/4
RND 7: 3/4	RND 8: 4/4	RND 9: N
RND10: 4/4	RND11: 4/4	

Thomas E. Orr
EIRA, Inc.
P. O. Box 6978
Metairie, LA 70009
504/469-0333

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: U	RND 8: U	RND 9: U
RND10: U	RND11: 4/4	

Mr. Gary C. Allen
Sunbelt Associates, Inc.
6961 Mayo Road
New Orleans, LA 70126
504/242-5026

RND 1: 4/4	RND 2: 3/4	RND 3: 8/8
RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

Ms. Virginia Dugan
Albuchemist, Inc.
501 Wyoming Blvd., S.E.
Albuquerque, NM 87123
505/268-7367

RND 1: N	RND 2: 4/4	RND 3: 7/8
RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
RND 7: 2/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

William M. Kemp
Oklahoma State Dept. of Health
Post Office Box 53551
1000 NE 10th Street
Oklahoma City, OK 73152
405/271-5221

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: U	RND 8: U	RND 9: 3/3
RND10: 4/4	RND11: 3/4	

Dr. Tom White
Oklahoma City - County Health Dept.
Laboratory Health Services
921 Northeast 23rd Street
Oklahoma City, OK 73105
405/427-8651

RND 1: U	RND 2: 3/4	RND 3: 8/8
RND 4: 4/4	RND 5: 4/4	RND 6: 4/4
RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

J. P. Forsman
Accredited Industrial Hygienists
P. O. Box 18566
Houston, TX 77203
713/477-8101

RND 1: U	RND 2: U	RND 3: U
RND 4: U	RND 5: U	RND 6: U
RND 7: 4/4	RND 8: 4/4	RND 9: 3/3
RND10: 4/4	RND11: 4/4	

REGION 6

Ron McKee McKee Env. Hlth. Svcs. 11114 Sage Park Houston, TX 77089 713/481-3501	RND 1: U RND 4: U RND 7: U RND10: 3/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: 2/3
Fred Blood Radian Corporation 8500 Shoal Creek Boulevard P. O. Box 9948 Austin, TX 78766 512/454-4797	RND 1: U RND 4: 4/4 RND 7: N RND10: N	RND 2: U RND 5: 4/4 RND 8: 4/4 RND11: 3/4	RND 3: U RND 6: 4/4 RND 9: 3/3
Larry Carroll Law Engineering Testing Co. 5500 Guhn Road Houston, TX 77040	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 3/4	RND 3: U RND 6: U RND 9: 3/3
Geroge Shattuck NUS Corp. 900 Gemini Houston, TX 77058 713/488-1810	RND 1: U RND 4: U RND 7: U RND10: 4/4	RND 2: U RND 5: U RND 8: U RND11: 4/4	RND 3: U RND 6: U RND 9: 3/3
Analytical Services Dept. Southwestern Laboratories, Inc. 2575 Lone Star Drive Dallas, TX 75212 214/688-0088	RND 1: 4/4 RND 4: 4/4 RND 7: 1/4 RND10: N	RND 2: 3/4 RND 5: 4/4 RND 8: 4/4 RND11: 4/4	RND 3: 8/8 RND 6: 4/4 RND 9: 3/3
Mr. David McNamara Continental Technical Services Environmental Health Division 9742 Skillman Dallas, TX 75243 214/343-2025	RND 1: 4/4 RND 4: 2/4 RND 7: 4/4 RND10: 4/4	RND 2: 4/4 RND 5: 4/4 RND 8: 4/4 RND11: 3/4	RND 3: 6/8 RND 6: 4/4 RND 9: 3/3

REGION 7

David Kimbrell Hall-Kimbrell Envr Services, Inc. 946 Tennessee Lawrence, KS 66044 913/749-2301	RND 1: U RND 4: U RND 7: 4/4 RND10: 4/4	RND 2: U RND 5: U RND 8: 4/4 RND11: 4/4	RND 3: U RND 6: 4/4 RND 9: 3/3
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Larron Laboratory
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Microprobe
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Health Science Associates
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Kenneth S. Cohen
Consulting Health Services
P.O. Box 1625
El Cajon, CA 92022
619/579-6233

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Micro-Chem Laboratories
349 Lincoln Avenue
San Jose, CA 95126
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RND10: 4/4 RND11: 3/4

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EMS Laboratories
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17605 Fabrica Way
Cerritos, CA 90701
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REGION 9

Mr. Fred Hertlein
Industrial Analytical Laboratory, Inc.
1523 Kalakaua Avenue
Suite 207
Honolulu, HI 96826
808/947-5402

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Appendix D

Quantitative Results

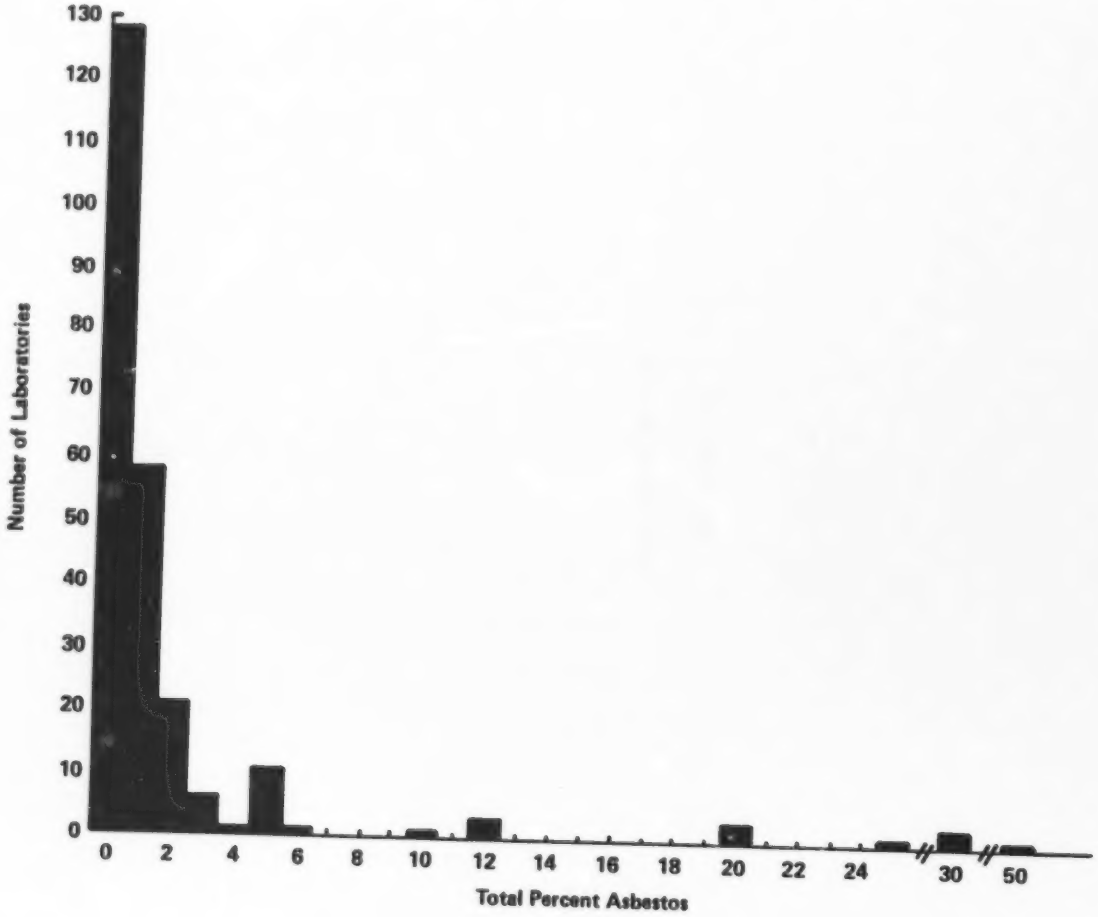

Figure 1. Round 9 quantitative results for Sample A. The sample contained <1% chrysotile, 40-50% mineral wool, 50-60% calcium carbonate and trace amounts of cellulose.

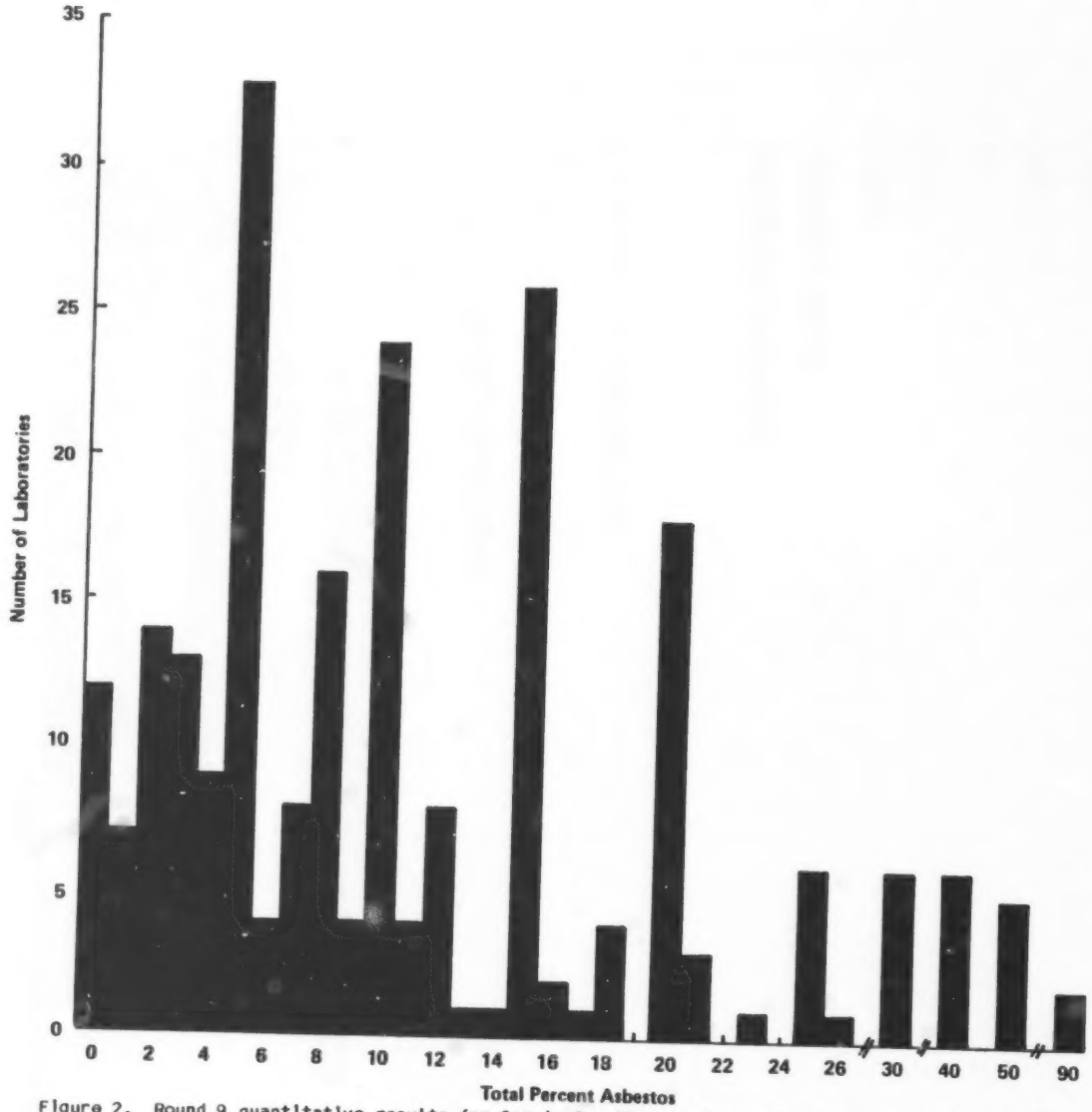

Figure 2. Round 9 quantitative results for Sample B. The sample contained 4-6% Amosite, 45-60% mineral wool, 40-50% calcium carbonate and trace amounts of cellulose.

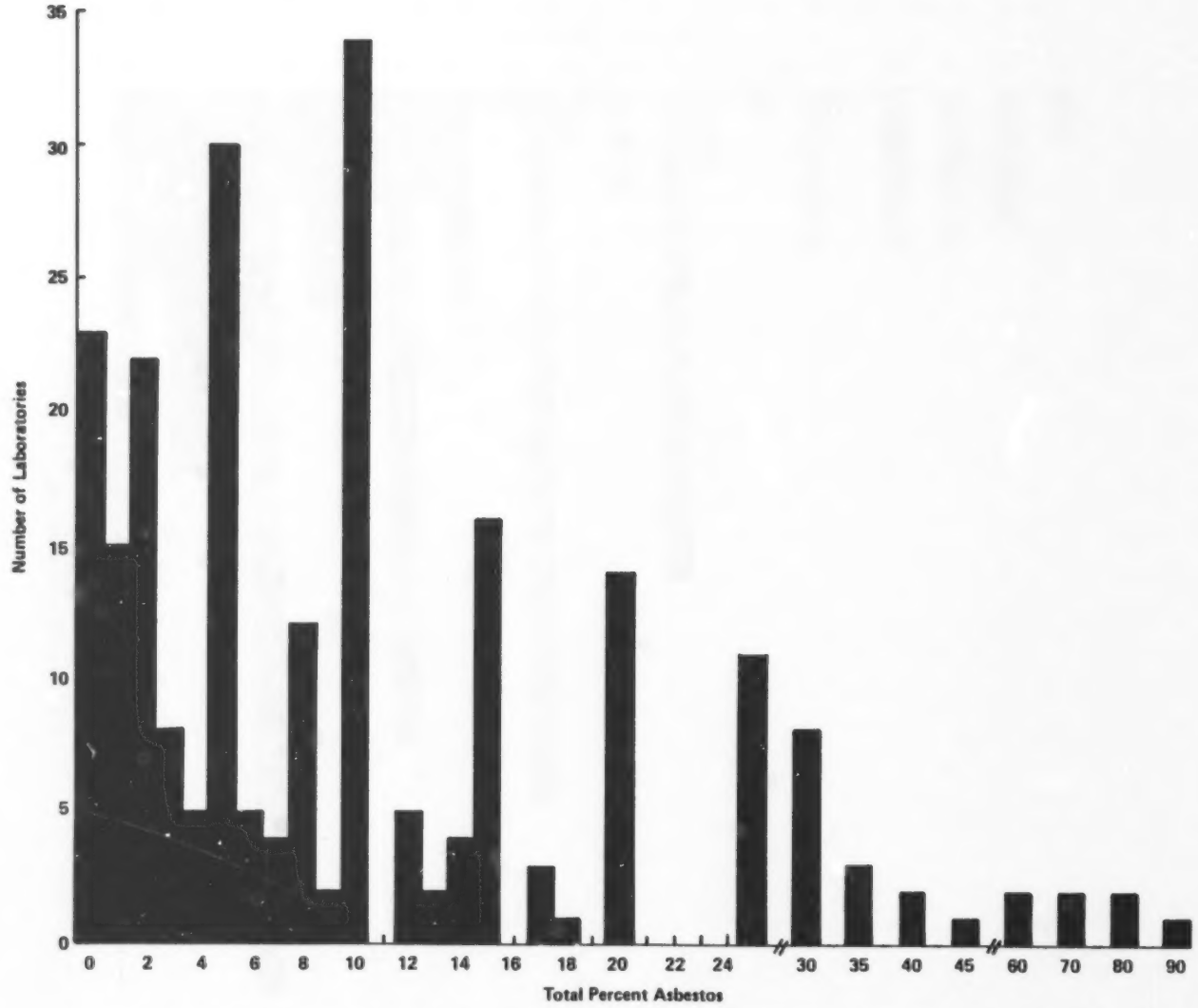

Figure 3. Round 9 quantitative results for sample C. The sample contained 1-3% chrysotile, 50-60% gypsum, 30-40% mica and <1% fibrous glass.

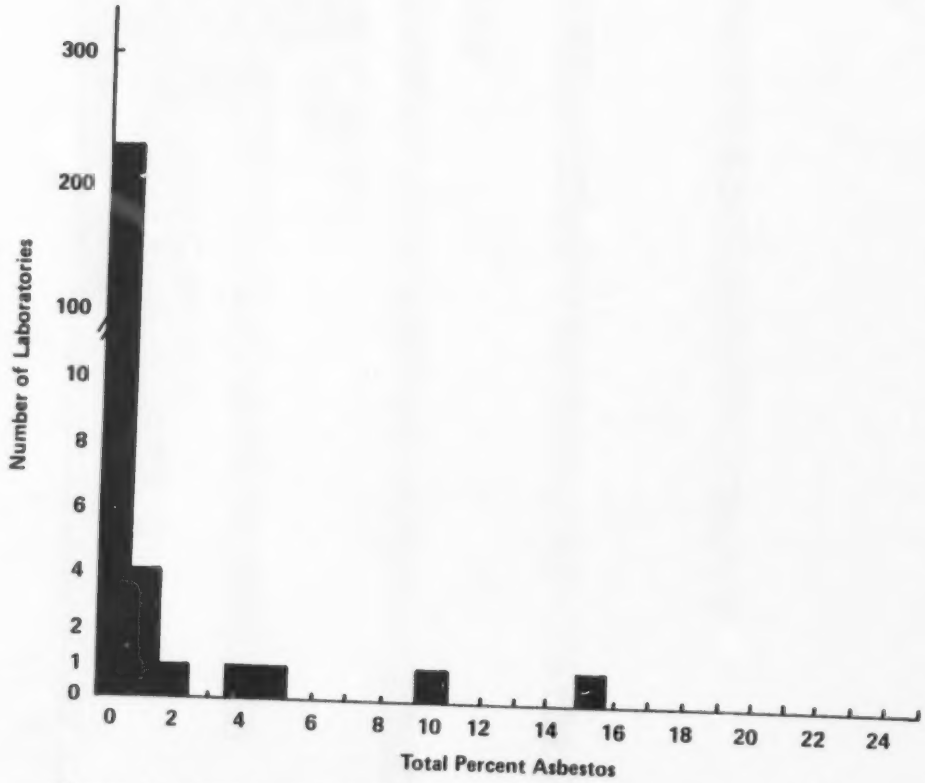

Figure 4. Round 9 quantitative results for sample D. The sample contained 4-8% fibrous glass, <1% cellulose and greater than 90% calcium carbonate.

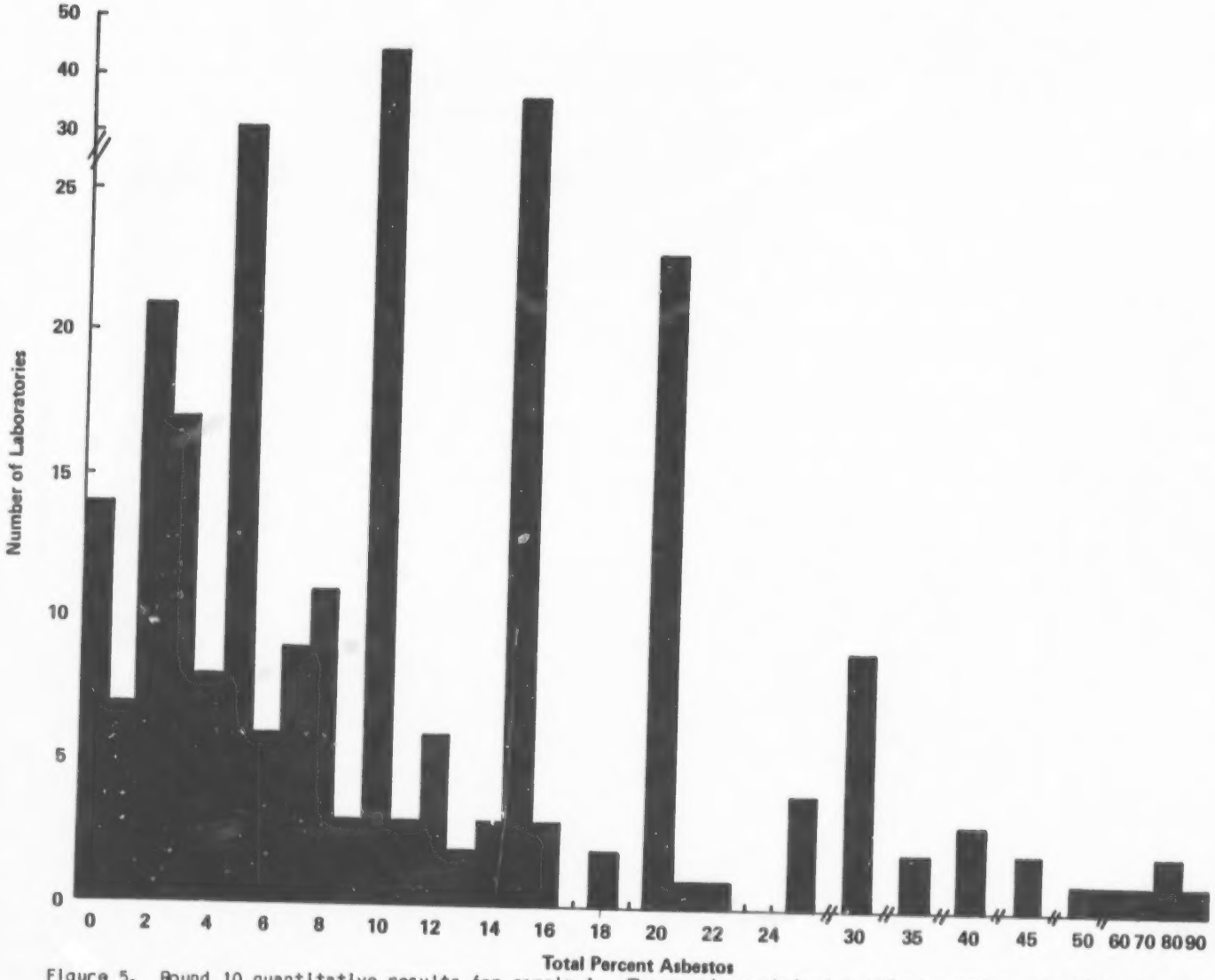

Figure 5. Round 10 quantitative results for sample A. The sample contained 8-13% chrysotile, 50-60% gypsum and 30-40% perlite.

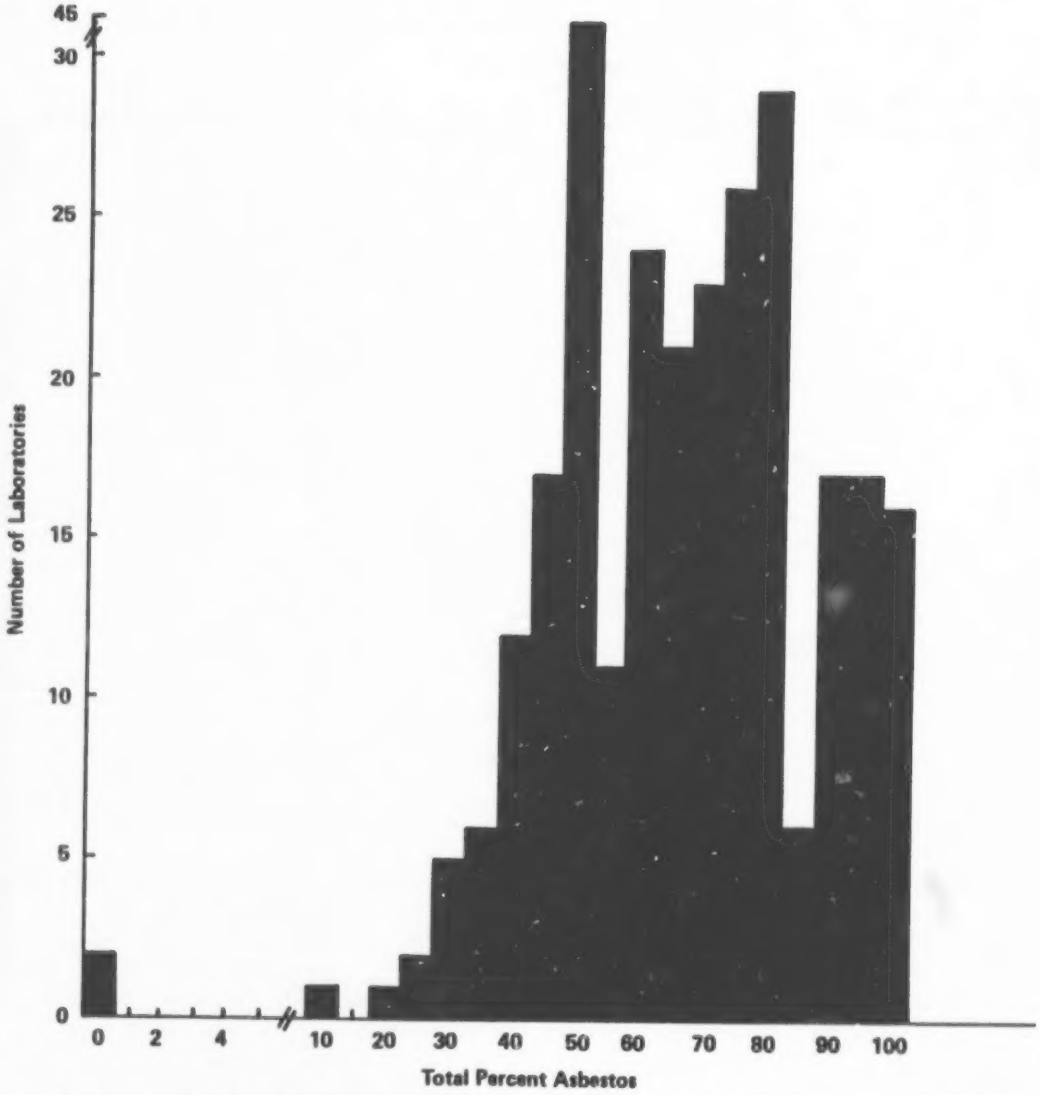

Figure 6. Round 10 quantitative results for sample B. The sample contained 50-60% chrysotile and 40-50% cellulose.

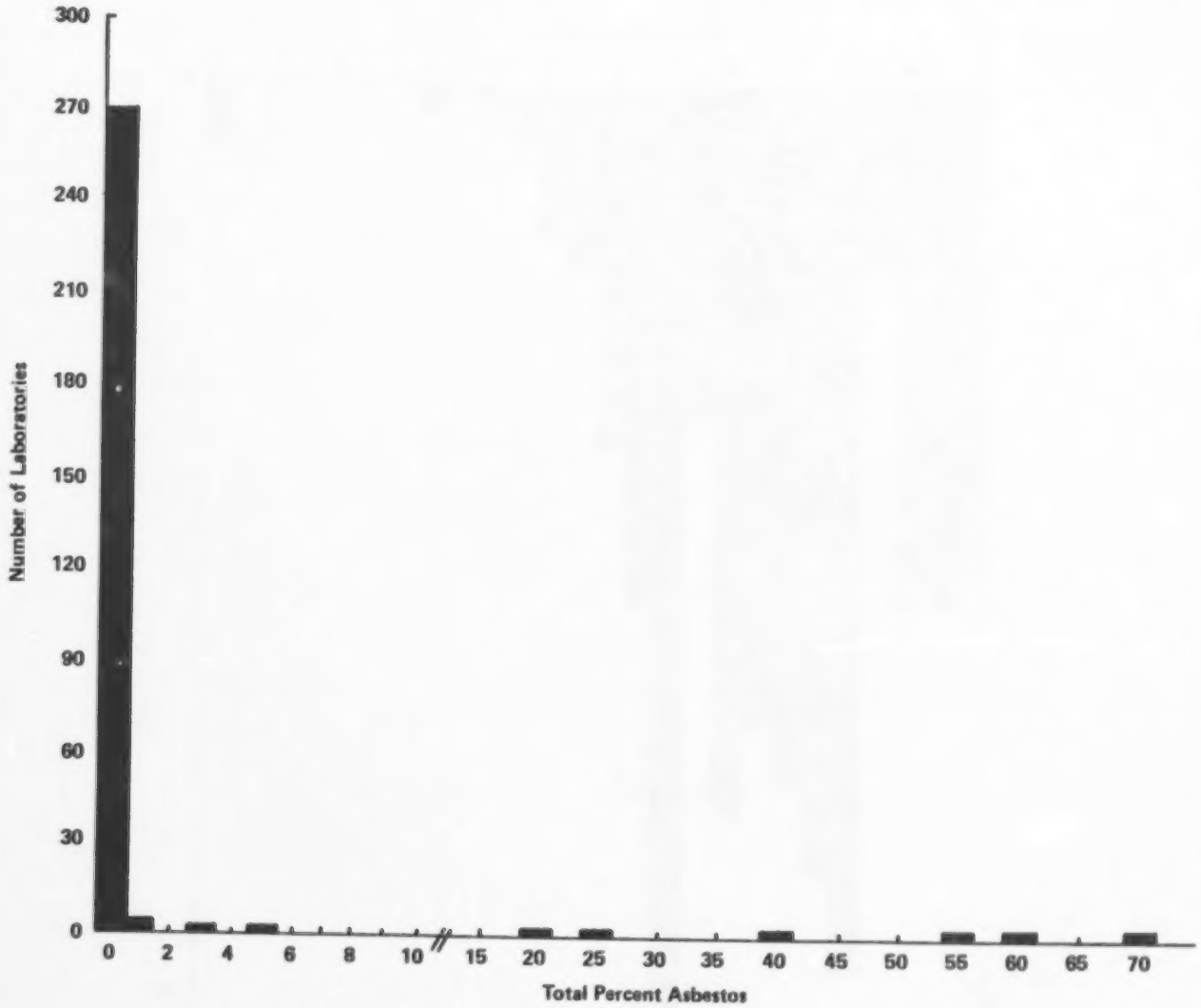

Figure 7. Round 10 quantitative results for sample C. The sample contained >99% cellulose and <1% gypsum and quartz.

Figure 8. Round 10 quantitative results for sample D. The sample contained >97% fibrous glass and <3% mica and carbonate.

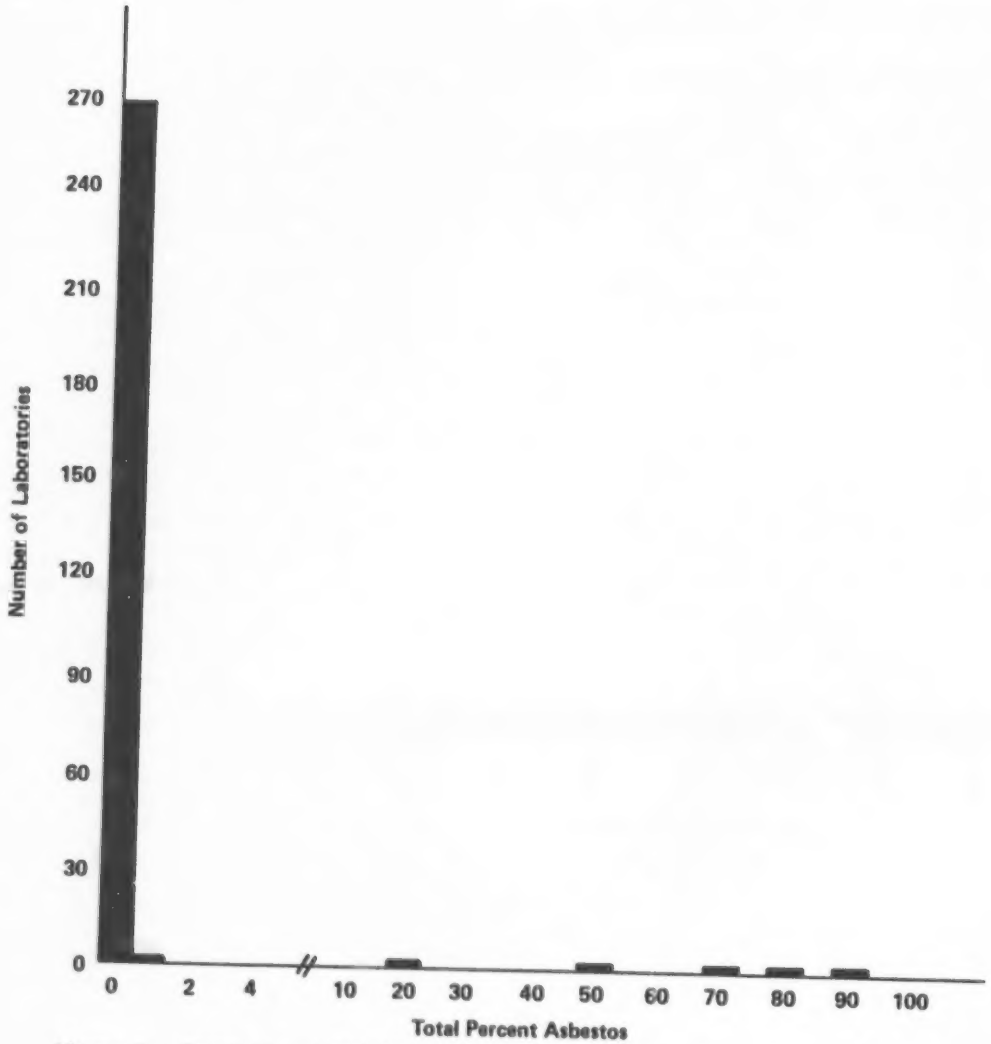

Figure 9. Round 11 quantitative results for sample A. The sample contained 100% fibrous glass.

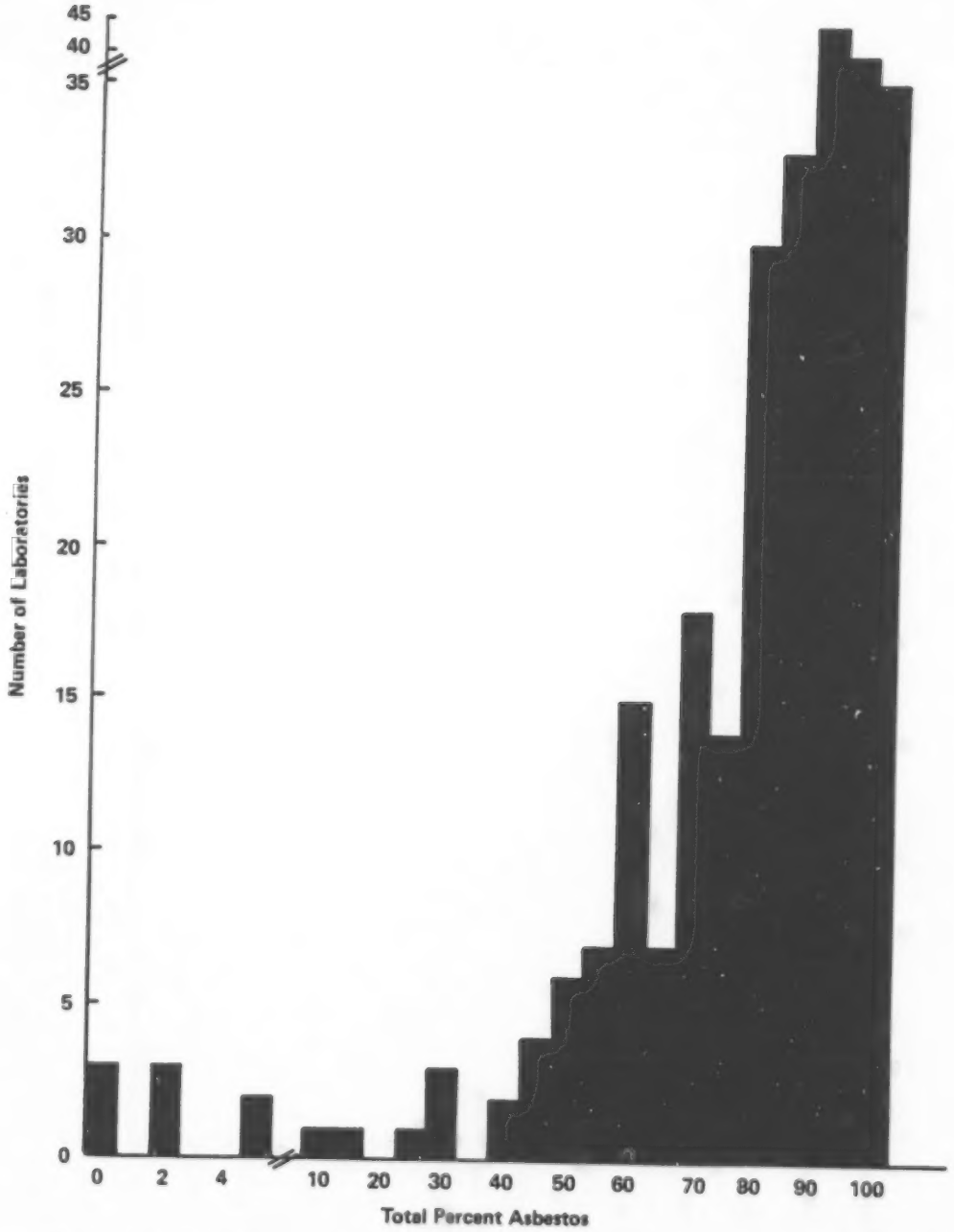

Figure 10. Round 11 quantitative results for sample B. The sample contained >98% crocidolite and <2% opaques, carbonates and trace unidentifiable phases.

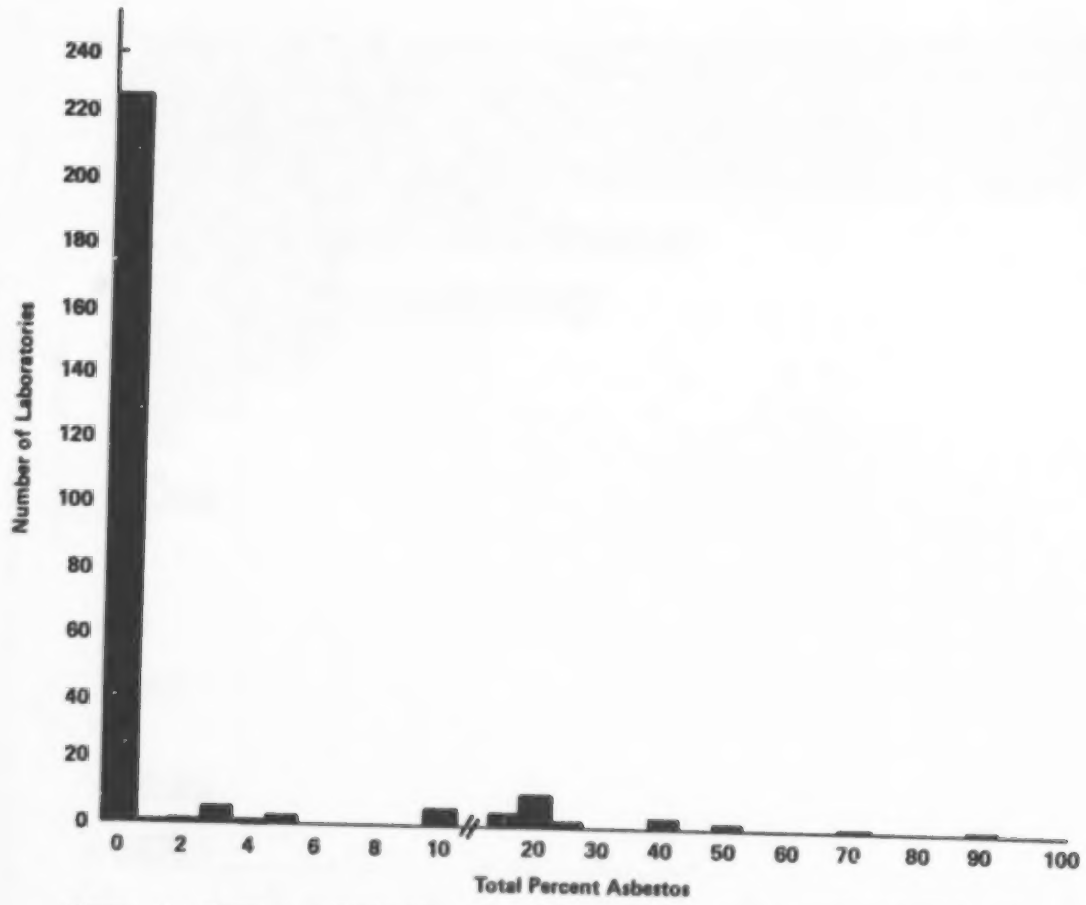

Figure 11. Round 11 quantitative results for sample C. The sample contained >98% pyrophyllite and <2% lime.

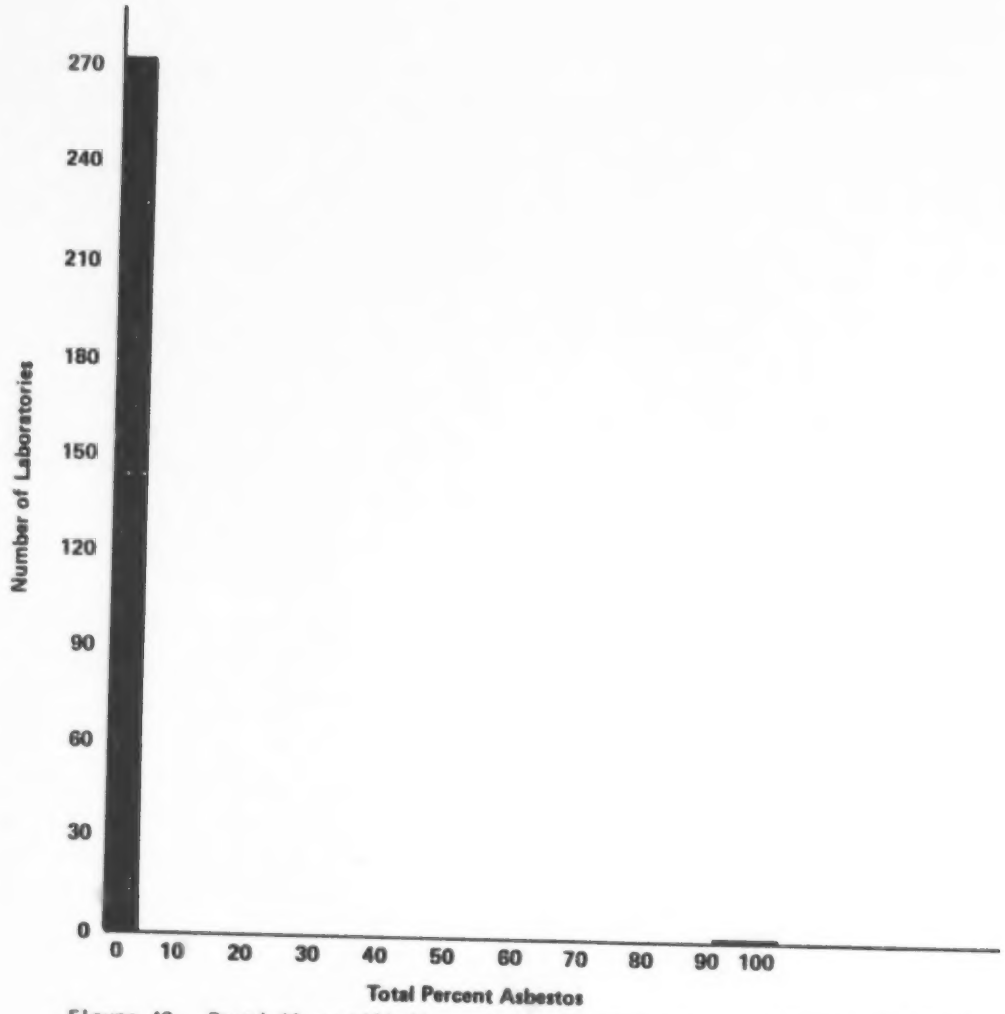

Figure 12. Round 12 quantitative results for sample C. The sample contained 100% carbon fibers.

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